

# SOIL SURVEY

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## McIntosh County Georgia

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UNITED STATES DEPARTMENT OF AGRICULTURE  
Soil Conservation Service  
In cooperation with  
UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE  
AGRICULTURAL EXPERIMENT STATIONS

# HOW TO USE THE SOIL SURVEY REPORT

**T**HIS SOIL SURVEY of McIntosh County, Ga., will serve various groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields, and it will add to the knowledge of soil scientists.

In making this survey soil scientists walked over the fields and woodlands. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in the growth of crops, weeds, and brush; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming, trees, wildlife, and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then, cartographers prepared from the photographs the detailed soil map in the back of this report. Fields, woods, roads, streams, and many other landmarks can be seen on the map.

## Locating the soils

Use the *index to map sheets* to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map is found, it will be seen that boundaries of the soils are outlined and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area located on the map has the symbol Wes. The legend for the detailed map shows that this symbol identifies Weston loamy fine sand. This soil and all others mapped in the county are described in the section "Descriptions of Soils."

## Finding information

Special sections of the report will interest different groups of readers. The introductory part, which gives general information about the county, will be of interest mainly to those not familiar with the area. The "Guide to Mapping Units" at the back of the report will help the reader in using the map and the report.

*Farmers and those who work with farmers* can learn about the soils in the section "Descrip-

tions of Soils" and then turn to the section "Management by Capability Units." In this way they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The soils are grouped by capability units; that is, groups of soils that need similar management and respond in about the same way. For example, Weston loamy fine sand is shown to be in capability unit IIIw-2. The management this soil needs will be stated under the heading for capability unit IIIw-2, in the section "Management by Capability Units." If help is needed in planning management for a farm, the local representative of the Soil Conservation Service or the county agricultural agent will give assistance. Members of the staffs of the State agricultural experiment stations and others familiar with farming in the county will also be glad to help.

*Foresters and others interested in woodlands* can refer to the section "Woodland Suitability Groups." In that section the kinds of trees in the county are described and the factors affecting the management of woodlands are explained.

*Engineers* will want to refer to the section "Engineering Uses of Soils." Tables in that section show characteristics of the soils that affect engineering.

*Soil scientists* will find information about how the soils were formed and how they are classified in the section "Formation, Classification, and Morphology of Soils."

*Students, teachers, and other users* will find information about soils and their management in various parts of the report, depending on their particular interest.

*Newcomers in McIntosh County* will be especially interested in the section "Soil Associations," which describes the broad patterns of the soils. They may also wish to read the section "Additional Facts About the County," which gives general information.

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Fieldwork for this survey was completed in 1959. Unless otherwise indicated, all statements in the report refer to conditions in the county at that time. This publication on the soil survey of McIntosh County, Ga., is part of the technical assistance furnished to the Coastal Soil Conservation District.



Growth Through Agricultural Progress

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# SOIL SURVEY<sup>1</sup> OF McINTOSH COUNTY, GEORGIA

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AGRICULTURE, AGRICULTURAL EXPERIMENT STATIONS

**M**cINTOSH COUNTY occupies approximately 275,840 acres, or 431 square miles, in the southeastern part of Georgia (fig. 1.). Darien, the county seat, is situated on the northern bluff of the Altamaha River. The county is bordered on the east by the Atlantic Ocean. It lies within the geographic area known as the Lower Coastal Plain. Much of this area is low and flat. Locally, it is called flatwoods.

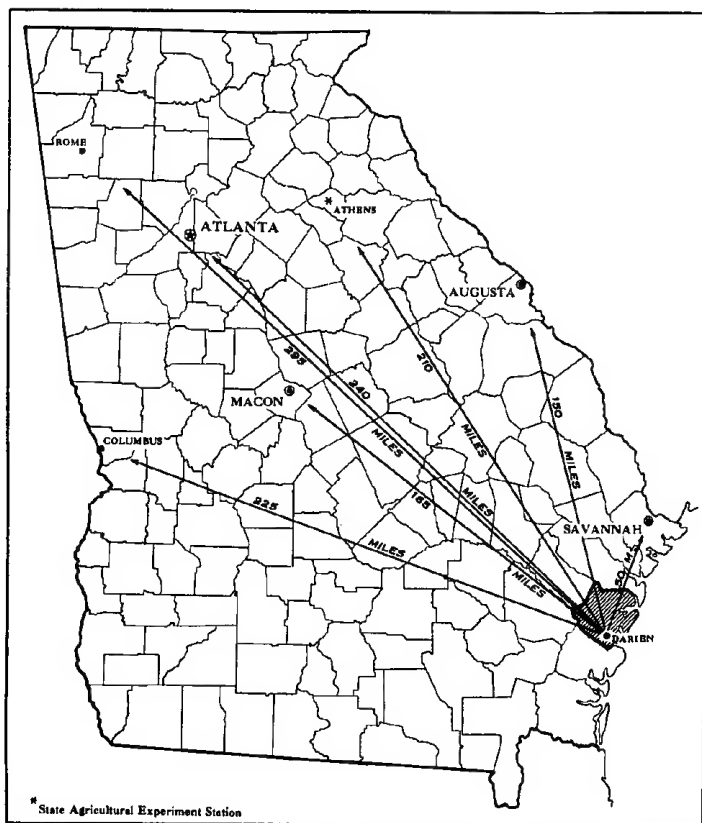


Figure 1.—Location of McIntosh County in Georgia.

A large part of the county is covered by a mixed stand of pines and hardwoods. Pulp and paper companies hold much of the acreage in large tracts that they manage and protect. Wood products taken from the forests and

seafood sold by commercial fishermen are among the chief sources of income in the county. A large number of livestock are also raised. Cattle are allowed to graze along the edges of the marshes and in the swamps and woodlands. There are a number of general farms in the county.

Because so much of the county is nearly level, streams are wide and sluggish. Large bays and swamps are common. During rainy periods, the water table rises sharply and water remains near the surface. The soils strongly reflect the influence of this high water table. Most of them are poorly drained.

The mainland is separated from the ocean by wide areas of tidal marsh. Beyond the marsh, to the east, are barrier islands, which face the sea. The Altamaha River, which flows along the southwestern boundary of the county, has a wide flood plain made up of swampy areas. At the mouth of this river, below Darien, are numerous delta islands. These merge with the salt marshes that are along the eastern side of the mainland.

Lying parallel to the coast, in the eastern part of the county, is a sand ridge that is 3 to 5 miles wide and 20 to 40 feet high. The ridge is continuous along the entire eastern border of the county, except for areas where it is cut by swamps or by narrow strips of marsh that finger back into the mainland.

In the western part of the county is another sand ridge that lies north of the Altamaha River. This ridge, which runs parallel to the swamp along the Altamaha River, is more rolling than the one along the coast. In most places it is 30 to 50 feet high, but in a few places it is as much as 80 feet high.

The rest of the county, inland and to the north and west of the sand ridges, is an extensive, low-lying plain. This area has flat to slightly undulating relief. Along the edges of many of the swamps are short, gentle slopes. In most places the plain is 10 to 20 feet above sea level, but in a few places it is as much as 30 feet. During periods when floodwaters are high, water from the Altamaha River sometimes leaves the flood plain, breaks through the sand ridge north of the swamp, and covers much of the western part of the county. Many communities are then isolated.

## Soil Associations

In mapping a county or other large tract, it is fairly easy to see definite differences as one travels from place to place. There are many obvious changes in the shape,

<sup>1</sup> Assistance on the technical sections of this report was given by W. P. GILLESPIE, ROY A. GRIZZELL, N. E. SANDS, and R. E. WILLIAMS of the Soil Conservation Service.

gradient, and length of slopes; in the course, depth, and speed of streams; in the width of valleys; in the kinds of native plants; and in the kinds of agriculture. With these more obvious differences, there are other less easily noticed differences in the patterns of soils. The soils differ from place to place along with the other parts of the environment.

By drawing lines around different patterns of soils on a small map, one may obtain a map of the general soil areas, or, as they are sometimes called, soil associations. Such a map is useful to those who want only a general idea of the soils, who want to compare different parts of the county, or who want to locate areas suitable for some particular kind of agriculture or other land use. The map cannot be used in planning management for any one farm, however, because it is too small.

The six general soil areas, or soil associations, are shown on the colored soil association map in the back of the report and are described in the following pages. For each association, the soil series of the principal soils in the area are named, but the soils of other series may also occur in the association. The soil series are discussed in the section "Descriptions of Soils."

### Association 1

*Frequently flooded alluvial soils along the eastern seaboard and along large rivers: Tidal marsh, Swamp, Wet alluvial land*

This association consists of large, flat areas of wet lands—Tidal marsh, Swamp, and Wet alluvial land—that are flooded periodically. The areas are cut by the many rivers, creeks, and sloughs. All of the soils are very poorly drained and are covered by water much of the time. The soils have developed in sediments washed from higher areas by rivers. They are predominantly clays or silty clays, but they also contain sand and partly disintegrated remains of grasses and pieces of wood.

The association is mainly along the coast and along the southern boundary of the county (fig. 2). It occupies about 38 percent of the total acreage in the county.

In the areas of Tidal marsh are many piles of rocks once used as ballast for ships. The areas of Tidal marsh are covered twice daily by tidal waters, which range in salt content from 5,000 to 35,000 parts per million. The surface layer of the soils making up these wet areas ranges in color from light brown to gray. The underlying material is mottled gray, brown, and red.

Swamp is at higher elevations than the areas of Tidal marsh. It is seldom covered by tidal waters. The surface layer in the areas of Swamp ranges from dark gray to black, and it is underlain by gray, plastic clay. Within the areas of Swamp are low ridges occupied by sandy soils. In these areas trails and paths follow the contours of the ridges.

Wet alluvial land is nearly level and occurs in broad areas on the delta of the Altamaha River. The islands lie between the areas of Swamp, which are upstream, and the areas of Tidal marsh. The soil materials in areas of Wet alluvial land generally consist of dark grayish-brown clay, underlain by dark-gray, plastic clay.



Figure 2.—Areas of Tidal marsh along the eastern border of the mainland.

Other miscellaneous land types that make up a minor part of the association are Coastal beach, Dune land, and Made land. The strips of Coastal beach are on the seaward side of Sapelo and Blackbeard Islands, and the areas of Dune land are on Sapelo Island. Small areas of Made land are along the Intracoastal Waterway.

The soils and miscellaneous land types that make up this association are mainly in capability class VII, but Wet alluvial land is in class IV. Vegetation in the areas of Tidal marsh is mainly smooth cordgrass, black rush, marsh cordgrass, and seashore saltgrass. In the areas of Swamp, the vegetation consists mainly of a mixed stand of lowland hardwoods. Much of the acreage of Wet alluvial land has been cleared and diked. Rice and lettuce were grown at one time, but the areas are now largely idle. Some of them have been rediked and are used as wildlife refuges.

This association is used mainly as habitats for wildlife. Areas that adjoin the uplands are used for grazing if they are dry enough for cattle to find sound footing.

### Association 2

*Poorly drained and very poorly drained soils on broad, depressed flats and in bays: Weston, Bayboro, Bladen-Coxville*

Areas of this association are widely distributed throughout the central and western parts of the county. The association consists mainly of Weston, Bayboro, and Bladen-Coxville soils. It makes up about 26 percent of the total acreage in the county. Many of the areas are covered at times with shallow water, and some of the soils are very poorly drained.

The Weston soils are extensive in this association. The upper part of their profile is sandy, and the sand overlies beds of clay interspersed with sand. The soils have a gray to dark-gray surface layer that overlies grayish, mottled sand or clay. In a few areas the texture in the upper part of the profile is very coarse sand.

The Bayboro soil is very poorly drained. It has a black, mucky surface layer, which, in a few areas, is rather thick. Beneath the surface layer is gray, plastic clay that is mottled in places. In some areas the Bayboro soil overlies sand.

The Bladen soils are on broad flats. In many places they occur in intricate mixtures with the Weston or Coxville soils. The surface layer of the Bladen soils is gray to black. It is generally thin and overlies highly mottled, structureless (massive) clay.

Included in this association is a small acreage of Portsmouth loams. Also included are scattered areas occupied by Rutlege soils.

The Bayboro soil, Bladen-Coxville fine sandy loams, Weston loamy sand, thick surface, and Weston loamy fine sand are in capability class III. Bladen loam and clay loam and Weston very coarse sand are in class V.

Little of this association has been cleared. Pines and hardwoods that tolerate water grow in many areas. The Bayboro soil and Bladen loam and clay loam support a thick undergrowth and trees that tolerate water. There are also a few palm trees in some of the areas. The Weston soils and Bladen-Coxville fine sandy loams are covered predominantly by pines, but there are a few scattered hardwoods. The undergrowth is less dense than that on the Bayboro soil and on the areas of Bladen loam and clay loam.

### Association 3

*Somewhat poorly drained to very poorly drained soils on broad, nearly level uplands and in bays: Leon, Rutlege*

This association consists mainly of somewhat poorly drained to very poorly drained Leon and Rutlege soils. The water table is high in these soils. Organic matter has accumulated on the surface or is in the soil profile. The association is mainly in the coastal sandy areas north of Darien. It occupies about 21 percent of the total acreage in the county.

The Leon soils are on low ridges and on broad flats. They have an A horizon of leached, whitish sand overlying a black or reddish-brown layer that is cemented with organic matter.

The Rutlege soil occurs in large bays and drainageways. On the surface it has the partly decayed remains of plants. The surface layer overlies gray sand.

St. Johns, Ona, Galestown, and Plummer soils occupy minor areas in the association. The St. Johns soil is in small, scattered areas that are usually ponded. The Ona soils, which are somewhat poorly drained, occur in intricate mixtures with the Leon soil. The Galestown soil is on the higher knolls and sand ridges, and the Plummer soils are on Blackbeard Island.

Nearly all of this association is under forest. Gums and cypresses grow on the very poorly drained areas. The Leon soil is covered by a dense growth of low-growing palmettoes, gallberry bushes, wicky, and other shrubs and by scattered, spindly pines. The Ona soils have a thicker stand of pine and a denser, taller undergrowth of palmettoes and gallberry bushes than the Leon soil. Deertongue, which is also called vanillaleaf, is common on the low ridges and on the broad uplands. The soils

are mainly in capability class V. In many of the areas, the soils are suitable as a source of road materials. There are many borrow pits throughout the association.

### Association 4

*Excessively drained to somewhat poorly drained sands on low ridges and bluffs: Galestown, Klej, Ona*

This association is made up mainly of Galestown, Klej, and Ona soils. The soils are nearly level. They are on sand ridges in the eastern part of the mainland and on offshore islands. Most of the areas are narrow, but a few are wide. On the sides of the areas facing the marsh, most of the soils have short bluffs. The association occupies about 9 percent of the total acreage in the county.

Some of the soils are excessively drained, and others have a seasonal high water table. The soils are mostly acid, but in a few areas, where shells are mixed with the surface layer, they are alkaline.

The Galestown soil is nearly level to very gently sloping. It has a dark-gray surface layer that overlies yellowish-brown fine sand.

The Klej soil is nearly level and occurs on low ridges. It has a surface layer of dark-gray to grayish-brown fine sand. The surface layer is underlain by yellowish-brown to olive, mottled sand.

The Ona soils are in areas that are lower than those occupied by the Galestown and Klej soils. They have a dark-gray surface layer that is underlain by brown, friable sand. The boundary between the two layers is abrupt.

Palm Beach, Lakeland, and Blanton soils occupy minor areas in the association. The Palm Beach and Lakeland soils are excessively drained. The Palm Beach soil occurs on the higher sand ridges and contains shells in the surface layer. The Blanton soil is moderately well drained.

More than 90 percent of the acreage in the association consists of soils in capability class III. The soils are largely in forest. Hardwoods and pines (fig. 3) make up most of the stand, but there are a few cedars.



Figure 3.—Live oaks and scattered loblolly pines growing on an area of Galestown fine sand.

## Association 5

*Moderately well drained, level to very gently sloping soils on low ridges and knolls, and poorly drained soils on slightly depressed flats: Eulonia-Fairhope, Bladen-Coxville*

This association consists mainly of Eulonia-Fairhope and of Bladen-Coxville soils. The areas are on flats that are dissected by bays, ponds, and winding, swampy areas. The association occupies about 5 percent of the total acreage in the county. Most of it is west of U.S. Highway No. 17. The soils have been affected by a high, seasonal water table. In most of the areas, the surface layer is fine sandy loam, but in some areas it is loamy fine sand.

The Eulonia-Fairhope soils are nearly level to very gently sloping. They have a very dark gray to black surface layer and a yellowish-brown to reddish-brown subsoil of sandy clay or clay.

The Bladen-Coxville soils are on broad flats and in slightly ponded areas. They have a dark-gray to black, thin surface layer and a gray to grayish-brown subsoil of sandy clay or clay.

A minor part of the association is made up of Lynchburg and Dunbar soils, which are somewhat poorly drained. Small areas of Weston soils are also intermixed with the Bladen soils.

The Eulonia-Fairhope soils are in class II, and the Bladen-Coxville soils, in class III. About 10 percent of the acreage in the association is cultivated. This comprises most of the cultivated acreage in the county. The farms are generally small and are operated by the owner. Corn and vegetables are the principal crops, and some areas are pastured. There are a few small dairy farms. The rest of the association is in trees. Most of the wooded areas are owned by large companies and are used to produce pulpwood.

## Association 6

*Excessively drained sands on high ridges adjacent to and within the Altamaha River swamp: Lakeland, Lakewood*

This association consists mainly of Lakeland and Lakewood soils. The soils are on high sand ridges. They have slopes that are generally less than 12 percent, but on the sides of a few bluffs their slopes are stronger. The Lakeland and Lakewood soils are excessively drained and have formed in beds of windblown sands. The association occupies about 1 percent of the total acreage in the county. The areas are adjacent to the Altamaha River.

The Lakeland soils have a thin surface layer of gray coarse sand. The surface layer overlies a yellowish-brown C horizon.

The surface layer of the Lakewood soil is also thin and consists of gray coarse sand. It overlies white sand.

Minor soils in the association are the Rutlege, St. Johns, and Leon. The Rutlege soil is in ponds and drainageways scattered throughout the sand ridges. The St. Johns and the Leon soils are in depressions on the ridges.

All of this association is in woods, but most of the areas have a sparse cover of trees. Turkey oak, bluejack oak, and scrub live oak are the principal kinds of trees. There are also a few scattered longleaf pines and spruce pines.

All the major soils of this association are in capability class VII.

## How a Soil Survey is Made

When a soil survey is made, the soils are examined, classified, and mapped. The mapping is done by a soil scientist who walks over the land and studies the soils. He bores or digs holes and looks at exposed gullies, cuts, and banks to examine the soils and the underlying rock formations. These borings and exposures show that most soils contain several distinct layers, or horizons, which together make up the soil profile.

**FIELD STUDY.**—Each horizon is studied and its characteristics are noted. The main horizons are designated by letters, for example, A, B, and C. Subdivisions of these major horizons are indicated by subscript letters and numbers, such as A<sub>p</sub>, A<sub>1</sub>, A<sub>2</sub>, B<sub>1</sub>, B<sub>2</sub>, or B<sub>3</sub>. These subdivisions are made if there is a worthwhile difference in the color, texture, structure, or consistence of the soil materials in a major horizon. By considering these characteristics, farmers, engineers, foresters, and others who work with soils can judge the behavior of the soils and can tell how to use the soils more effectively.

The *color* of each horizon is noted. Colors are determined from the Munsell color chart and are shown by numbers and letters. As an example, 10YR 5/2 is grayish brown, and 2.5Y 5/4 is light olive brown (14).<sup>2</sup> The color of the surface soil is normally related to the amount of organic matter. Streaks and spots of gray, yellow, red, and brown in the subsurface layer and subsoil indicate poor natural drainage and restricted aeration. This coloration is called mottling. Uniform brown, yellow, and red colors indicate well-drained soils.

*Texture*, or the proportionate content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers. Later, the soil is checked in the laboratory by mechanical analyses. Texture has much to do with how well the soil retains moisture, plant nutrients, and fertilizer and whether it is easy or difficult to cultivate.

*Structure*, which is the way individual soil particles are arranged in larger grains and the amount of pore space between particles, indicates how easily plant roots can penetrate the soil. Structure also affects the rate water enters and filters through the soil.

*Consistence*, or the tendency of the soil particles to hold together, indicates whether the soil is easy or difficult to keep open and porous under cultivation.

**Other characteristics.**—The soil scientist also determines the thickness of the soil profile; that is, the depth to bedrock or to compact layers and parent materials. The kind of parent material from which the soils develop affects the quantity and kind of plant nutrients in the soil. The amount of stone, rock, sand, and other materials is observed, as well as the steepness and length of slopes and the amount of soil lost through erosion. After the soils have been examined, the physical characteristics are recorded and the boundaries of the soils are drawn on an aerial photograph. Later, the finished maps that are in the soil survey report are made by cartographers. Laboratory tests determine the exchange of plant nutrients, moisture-holding capacity, chemical reaction, lime requirements, and other internal characteristics of the soils.

<sup>2</sup> Italic numbers in parentheses refer to Literature Cited, p. 60.



**CLASSIFICATION.**—On the basis of the characteristics observed by the soil scientists or determined by laboratory tests, the soils are classified by soil series, type, and phase.

**Soil series.**—A soil series consists of soils that, except for the texture of the surface layer are similar in kind, thickness, and arrangement of layers, or horizons. All soils in the same series have formed from the same kind of parent material. Each series is named for a place near the area where it was first mapped.

**Soil type.**—Each series is made up of one or more types. Soils that are similar in kind, thickness, and arrangement of soil layers, and that have the same texture in the surface layer, make up one soil type. Soil types may be subdivided into phases on the basis of slope, amount of erosion, or some other characteristic.

**Soil phase.**—The soil phase, or the soil type if it has not been subdivided, is the mapping unit on the soil map. It is the unit that has the narrowest range of characteristics. More specific use and management can be prescribed for the soil type or soil phase than for the soil series or other yet broader categories.

The following illustrates the subdivision of the Lakeland series into types, and the types, in turn, into phases.

- Series:
  - Lakeland.
- Types:
  - Lakeland sand.
  - Lakeland coarse sand.
- Phases:
  - Lakeland sand, 0 to 2 percent slopes.
  - Lakeland sand, 5 to 8 percent slopes.
  - Lakeland coarse sand, deep, 2 to 5 percent slopes.
  - Lakeland coarse sand, deep, 5 to 12 percent slopes.

**Soil complex.**—When two or more soils are so intricately associated in small areas that it is not feasible to show them separately on the map, they are mapped together and called a soil complex. An example of this is the Bladen-Coxville complex.

**Soil variant.**—A soil variant is a taxonomic soil unit that is closely related to another taxonomic unit, such as a soil series, but that departs from it in at least one differentiating characteristic at the series level. The soil variant is named for the series that it closely resembles, and its principal distinguishing feature is stated. For example, Ona and Scranton fine sands, alkaline variants, are similar to other soils in the Ona and Scranton series. They are, however, markedly different from other Ona and Scranton soils in reaction and in the properties that influence soil reaction. Variants are of too small known extent to justify establishing a new series.

**Miscellaneous land types.**—Areas of fresh stream deposits, marshes, and the like have little true soil and are not classified by soil series and soil types. Weathering has not altered the materials to the extent that distinct layers have formed. These areas are identified by descriptive names. In this county the miscellaneous land types are Coastal beach; Dune land; Made land; Swamp; Tidal marsh, high; Tidal marsh, low; and Wet alluvial land.

## Descriptions of Soils

This section provides detailed information about the soils of McIntosh County. It describes the single soils, or mapping units, in the county; that is, the areas on the

detailed soil map that are bounded by lines and identified by a symbol. For more generalized information, the reader can refer to the section "Soil Associations," in which the soils that make up each general soil pattern are discussed and related to each other.

In this section the soil series are arranged in alphabetical order and described. All the soils of one series that have the same texture in the surface layer are described together. For example, all the Weston soils that have a surface layer of loamy fine sand are described, and then all the Weston soils that have a surface layer of loamy sand.

In each series only one mapping unit is described in detail. An important part of this description is the soil profile, which identifies the soil horizons, or layers, to a depth of 42 inches or more. All of the soils in a series have basically the same kind of profile. The texture of the surface layer will differ somewhat. To illustrate, a detailed profile of Weston loamy sand, thick surface, is given, and the reader is to conclude that Weston loamy fine sand and Weston very coarse sand also have this same kind of profile, except for differences in the surface layer.

The location and distribution of the mapping units can be seen by referring to the soil map at the back of this report. The approximate acreage and proportionate extent of the mapping units are given in table 1.

The description of the soil series are somewhat technical. A number of technical terms are defined in the Glossary at the back of the report, as well as general terms that have special meaning in soil science. It will also be helpful to refer to the section "How a Soil Survey is Made" where series, type, phase, and other special terms are discussed.

## Bayboro Series

The Bayboro series consists of soils that are very poorly drained and very strongly acid. The soils are in small depressions and in large bays. They have developed in thick beds of marine clay, where the level of the ground water was fluctuating but relatively high. The soils are in lower positions than those occupied by associated soils in the county. They have slopes ranging from 0 to 2 percent. The surface layer in the typical profile is black clay loam, and the subsoil is dark-gray clay. In some of the areas, there is a D horizon of sand.

These soils are medium in natural fertility. Their content of organic matter and moisture-holding capacity are high.

The Bayboro soils are associated with Bladen, Coxville, and Weston soils. They are in lower positions, are more poorly drained, and have a thicker, darker surface layer than any of those soils. They also lack the sand lenses that are common throughout the profile of the Weston soils.

The present vegetation is chiefly common baldcypress, pond baldcypress, water tupelo, black tupelo, myrtle-leaved holly, maidencane, and sawgrass. Only one soil of this series—Bayboro clay loam—occurs in this county.

**Bayboro clay loam** (0 to 2 percent slopes) (BhA).—This very poorly drained, strongly acid soil occurs in small, shallow depressions, in large bays or wet drainageways, and in pocosins, or swamps. It is mainly in the central and western parts of the county. The

TABLE 1.—*Estimated acreage and proportionate extent of the soils*

Soil	Area	Proportionate extent
	<i>Acres</i>	<i>Percent</i>
Bayboro clay loam.....	22, 228	8. 1
Bladen loam and clay loam.....	9, 021	3. 3
Bladen-Coxville fine sandy loams.....	8, 389	3. 0
Blanton fine sand, 0 to 5 percent slopes.....	410	. 1
Coastal beach.....	1, 112	. 4
Dunbar fine sandy loam, 0 to 2 percent slopes.....	1, 712	. 6
Dune land.....	1, 000	. 4
Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes.....	3, 772	1. 4
Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes.....	1, 283	. 5
Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes.....	442	. 2
Fairhope fine sandy loam, 2 to 5 percent slopes.....	471	. 2
Galestown fine sand, 0 to 2 percent slopes.....	13, 036	4. 7
Klej fine sand, 0 to 2 percent slopes.....	4, 067	1. 5
Lakeland sand, 0 to 2 percent slopes.....	2, 080	. 7
Lakeland sand, 5 to 8 percent slopes.....	738	. 3
Lakeland coarse sand, deep, 2 to 5 percent slopes.....	485	. 2
Lakeland coarse sand, deep, 5 to 12 percent slopes.....	935	. 3
Lakewood coarse sand, thick surface, 5 to 8 percent slopes.....	535	. 2
Leon fine sand.....	24, 301	8. 8
Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes.....	2, 472	. 9
Made land.....	175	. 1
Meggett loam.....	205	. 1
Ona fine sand.....	7, 893	2. 9
Ona and Scranton fine sands, alkaline variants.....	1, 425	. 5
Palm Beach fine sand, dark.....	1, 500	. 5
Plummer sands.....	3, 364	1. 2
Portsmouth loam.....	583	. 2
Rutlege fine sand.....	17, 872	6. 5
St. Johns fine sand.....	6, 657	2. 4
Swamp.....	20, 260	7. 3
Tidal marsh, low.....	75, 654	27. 4
Tidal marsh, high.....	1, 831	. 7
Weston loamy sand, thick surface.....	18, 081	6. 6
Weston loamy fine sand.....	10, 602	3. 8
Weston very coarse sand.....	223	. 1
Wet alluvial land.....	5, 647	2. 0
Federal land not in survey area.....	5, 379	1. 9
Total.....	275, 840	100. 0

following describes a profile in a wet, wooded area 1 mile southeast of Townsend and 0.5 mile south of State Highway No. 99, along International Paper Company pasture road.

- A<sub>1</sub> 0 to 10 inches, black (N 2/0) clay loam that is high in organic matter; moderate, medium, crumb structure; friable; numerous roots; very strongly acid; 6 to 14 inches thick; gradual, wavy boundary.
- B<sub>1a</sub> 10 to 17 inches, very dark gray (10YR 3/1) clay loam; weak, medium, angular blocky structure; firm; common, faint, distinct root stains of dark brown (7.5YR 4/4); very strongly acid; 3 to 12 inches thick; gradual, wavy boundary.
- B<sub>2a</sub> 17 to 25 inches, dark-gray (10YR 4/1) clay; moderate, coarse, angular blocky structure; slightly plastic when wet; few, fine, distinct root stains of brown to dark brown (7.5YR 4/4); very strongly acid; 6 to 12 inches thick; gradual, wavy boundary.

B<sub>3a</sub> 25 to 34 inches, dark-gray (N 4/0) clay; moderate, medium, angular blocky structure; plastic when wet; few, fine, distinct root stains of brown to dark brown (7.5YR 4/4); very strongly acid; 6 to 14 inches thick; gradual, wavy boundary.

C<sub>a</sub> 34 to 64 inches, gray (N 5/0) clay; moderate, medium, angular blocky structure; plastic when wet; many, medium, prominent mottles of brownish yellow (10YR 6/8) and dark reddish brown (5YR 3/4); very strongly acid.

The color of the surface layer ranges from dark gray to black. In a few areas the texture of the surface layer is loam. The number of mottles in the subsoil varies. In some areas the subsoil contains large amounts of organic matter.

Included with this soil are areas of Bladen loams and of Bladen clay loams that were too small to map separately. Also included are small areas of Portsmouth loams.

Bayboro clay loam is medium in natural fertility. It is high in content of organic matter and in moisture-supplying capacity. Surface runoff is slow, and water is often ponded. The soil has a thick root zone, is slowly permeable, and has fair tilth. It is well suited to truck crops and pasture if it is properly drained. If the excess surface water is removed, slash pines will be encouraged to reproduce and grow. Nearly all of the acreage is in trees. (Capability unit IIIw-2; woodland group 4; range site, Bladen Flatwoods.)

### Bladen Series

The Bladen series consists of poorly drained soils that are on broad flats and in slightly ponded areas. Most areas of the soils are strongly acid. The soils formed in thick beds of clay and sandy clay on low marine terraces. Their slopes range from 0 to 2 percent.

These soils are low in natural fertility. Their content of organic matter is low to medium.

The Bladen soils are associated with Coxville, Dunbar, Weston, and Bayboro soils. They resemble the Coxville and the Dunbar soils closely, but they are in lower positions and have poorer drainage than those soils. Unlike the Coxville and Dunbar soils, the Bladen soils have few red mottles in the subsoil. Bladen soils are in positions similar to those occupied by the Weston soils but contain more clay than the Weston soils. They are better drained than the Bayboro soils, and their surface layer contains less organic matter than that of the Bayboro soils.

The natural vegetation is chiefly slash pine, longleaf pine, sweetgum, and blackgum, but there are a few white oaks, post oaks, and water oaks. The undergrowth is largely myrtle brush, wiregrass, and sawgrass. Nearly all of the acreage is in trees, but in most areas the stand is sparse.

In places in this county, the Bladen loams and Bladen clay loams are mapped together as a single unit. In other places the Bladen soils occur in intricate mixtures with the Coxville soils and the soils of the two series are mapped together.

**Bladen loam and clay loam (0 to 2 percent slopes) (BjA).**—These poorly drained soils are very strongly acid. They occur on broad flats and in slight depressions in the central and western parts of the county. The following describes a profile of Bladen clay loam in a moist, wooded

area 1 mile east of Cox and 50 yards north of State Highway No. 251.

- A<sub>1</sub> 0 to 9 inches, gray (N 5/0) clay loam; common, fine, distinct mottles of light olive brown (2.5Y 5/4); moderate, medium, angular blocky structure that breaks easily to moderate, medium, granular structure; firm; very strongly acid; 3 to 10 inches thick; gradual, wavy boundary.
- B<sub>1g</sub> 9 to 14 inches, gray (N 5/0) clay; common, fine prominent mottles of brownish yellow (10YR 6/8); moderate, fine, angular blocky structure; firm, slightly plastic when wet; strongly acid; 3 to 6 inches thick; gradual, wavy boundary.
- B<sub>2g</sub> 14 to 27 inches, gray to light-gray (N 6/0) clay; common, medium, prominent mottles of brownish yellow (10YR 6/8) and strong brown (7.5YR 5/8); moderate, medium, angular blocky structure; very firm, plastic when wet; strongly acid; 10 to 18 inches thick; gradual, wavy boundary.
- B<sub>3g</sub> 27 to 40 inches, gray to light-gray (N 6/0) clay; many, coarse, prominent mottles of yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8); moderate, medium, angular blocky structure; very firm, plastic when wet; 10 to 18 inches thick; gradual, wavy boundary.
- C<sub>g</sub> 40 to 48 inches +, gray to light-gray (N 6/0) clay; common, coarse, prominent mottles of yellowish red (5YR 5/8), strong brown (7.5YR 5/8), and yellowish brown (10YR 5/8); massive; very firm, plastic when wet; medium acid.

The color of the surface layer ranges from gray to black. In some areas a thin layer of loam or very fine sandy loam overlies the clay loam. The surface layer commonly cracks when it dries, especially in areas where the texture is clay loam. In some areas there are prominent mottles of yellow and strong brown in the subsoil; in others the mottles are predominantly gray, but there are a few faint mottles of olive or yellow.

Included with these soils are areas of Bladen and Coxville fine sandy loams, Dunbar fine sandy loams, Weston loamy fine sands, and Bayboro clay loams. These were too small to map separately.

Areas of Bladen loam and clay loam are generally low in natural fertility and are low to medium in content of organic matter. Surface runoff is very slow. Water is ponded in many areas, and it stands in the shallow depressions much of the time. Permeability is very slow. Tilth is poor, especially in the areas of Bladen clay loam. The soils should be worked only when they are slightly moist.

Most of the acreage is in trees, but a few areas are idle or in permanent pasture. Poor tilth and poor drainage make the soils unsuited to cultivated crops. In addition, some areas are not readily accessible. (Capability unit Vw-1; woodland group 4; range site, Bladen Flatwoods.)

**Bladen-Coxville fine sandy loams** (0 to 2 percent slopes) (BkA).—In places in this county, the Bladen and Coxville soils occur in intricate mixtures. Many of the individual areas of Bladen and of Coxville soils are only a few feet wide. The individual areas are, therefore, too small to map separately, and the soils of the two series are mapped together as a single unit. The Bladen soils have slightly poorer drainage than the Coxville soils. The profile is similar in the soils of both series. The subsoil of the Bladen soils is prominently mottled, however, with yellowish red, strong brown, and yellowish brown, and that of the Coxville soils, with dark red.

A profile typical of the Bladen soils is described under

the Bladen loam and clay loam mapping unit. A profile of the Coxville soils is given under the Coxville series.

Bladen-Coxville fine sandy loams are generally low in organic matter and in natural fertility. The moisture-supplying capacity is moderate. The soils are predominantly strongly acid throughout, but in a few areas the substratum is mildly alkaline. Because of the nearly level relief, surface runoff is slow. Permeability is slow to very slow.

Most of the acreage is in trees, but a few areas are in pasture, in gardens, or idle. If the soils are to be used for cultivated crops or pasture, they require drainage. (Capability unit IIIw-2; woodland group 6; range site, Bladen Flatwoods.)

### Blanton Series

The Blanton series consists of deep, moderately well drained, very strongly acid soils of the Coastal Plain. The soils have formed in marine sands on low ridges. They have slopes of 0 to 5 percent. The surface layer is fine sand and ranges in color from gray or olive gray to light gray or light brownish gray. It is underlain by light-gray to white, structureless sand. In places the subsurface layer is mottled.

The soils are low in fertility. They contain little organic matter.

The Blanton soils are associated with Klej, Lakeland, Ona, and Plummer soils. They resemble the Klej soils closely, but they have a light-gray or white, mottled C horizon instead of a mottled yellow or pale-yellow C horizon like that of the Klej soils. The Blanton soils have slightly poorer drainage than the Lakeland soils. Their C horizon also differs from that of the Lakeland soils, which is pale yellow. The Blanton soils are somewhat better drained than the Ona soils. They lack the layer of friable soil material, stained with organic matter, that underlies the surface layer of the Ona soils. The Blanton soils have a lighter gray color throughout and are much better drained than the Plummer soils.

The principal vegetation is large live oaks, bluejack oaks, post oaks, longleaf pines, and slash pines. The understory is mainly wiregrass, myrtle, gallberry, and palmetto. Only one soil of this series—Blanton fine sand, 0 to 5 percent slopes—occurs in this county.

**Blanton fine sand, 0 to 5 percent slopes** (BnB).—This moderately well drained, acid soil is very sandy. It occurs on the level parts of sand ridges in the eastern part of the county. The following describes a profile in a moist, wooded area 0.5 mile northeast of Crescent along a dirt road.

- A<sub>1</sub> 0 to 10 inches, olive-gray (5Y 5/2) fine sand; single grain; loose; very strongly acid; 6 to 12 inches thick; gradual, wavy boundary.
- A<sub>2</sub> 10 to 22 inches, light brownish-gray (2.5Y 6/2) fine sand; single grain; loose; very strongly acid; 6 to 12 inches thick; gradual, wavy boundary.
- C 22 to 48 inches +, light-gray (2.5Y 7/2) fine sand, lighter colored, or whitish, with increasing depth; single grain; loose; very strongly acid.

In some areas the surface layer is gray or dark gray. In a few areas the subsurface layer is pale brown. In a few places the texture of the surface layer is medium sand. There are splotches or streaks of white and pale yellow in the profile in some places, but most of these are faint.

This soil occurs mainly in small, scattered areas that are mostly covered by trees. A fairly large acreage on Blackbeard Island is covered by virgin forest. The forest consists mainly of loblolly pine and live oak, but it includes a few holly trees, cedars, and palmettoes. In other places the soil is covered by a stand of pine and oak and an undergrowth chiefly of palmetto, gallberry, and huckleberry.

This soil is generally low in organic matter and in fertility. It is rapidly permeable. Tilth is good and roots can penetrate deeply. The soil is slightly droughty in summer. The areas are not readily accessible, and the acreage is small. Therefore, this soil is of only minor importance to agriculture and is mostly in trees. (Capability unit IVw-3; woodland group 3; range site, Sandy Flatwoods.)

## Coastal Beach

**Coastal beach** (Cub).—This miscellaneous land type is mapped only on the barrier islands—Sapelo, Blackbeard, and Wolf. It is on the seaward side of these islands and is constantly washed by the sea. On the inland side it adjoins areas of Dune land or Tidal marsh.

Coastal beach has a very gentle slope toward the ocean. It is sandy, void of vegetation, wet and high in salinity. The areas are constantly changing in extent and shape. In general, the northern ends of the barrier islands are eroding. The southern ends are growing larger as sand is deposited by wind and water. (Capability unit VIIIa-1.)

## Coxville Series

The Coxville series consists of poorly drained, strongly acid soils on broad flats and in slightly ponded areas. The soils have formed in low marine sediments that are dominantly fine textured. They have slopes ranging from 0 to 2 percent. The surface layer in the typical profile is very dark gray fine sandy loam and is 6 to 14 inches thick. The subsoil is gray or dark-gray sandy clay to clay, prominently mottled with red in the lower part. In some of the areas, there is a D horizon of sandy loam or loamy sand.

These soils are low in natural fertility and in organic matter. They are moderate in moisture-supplying capacity and have fair tilth.

The Coxville soils are associated with Dunbar, Weston, Bayboro, and Bladen soils. They are more poorly drained than the Dunbar soils, and their subsoil is much finer textured than the subsoil in the Weston soils. The Coxville soils are in slightly higher positions, are a little better drained, and contain less organic matter in the surface layer than the Bayboro soils. They are similar to the Bladen soils, but they occur in slightly higher positions and are less subject to ponding.

The natural vegetation is mainly longleaf, loblolly, and slash pines, but there are a few sweetgum, blackgum, red maple, and swamp holly trees. Most of the acreage is in trees.

The Coxville soils are not mapped separately in this county but are mapped with the Bladen soils.

The following describes a profile of a Coxville fine sandy loam in a moist, wooded area 6.9 miles north of Darien

on U.S. Highway No. 17, 1.5 miles west on the county road, and 0.8 mile north on the Jim Cook Spur.

- A<sub>1</sub> 0 to 5 inches, very dark gray (N 3/0) fine sandy loam; weak, fine, granular structure; very friable; very strongly acid; 3 to 6 inches thick; gradual wavy, boundary.
- A<sub>2</sub> 5 to 11 inches, dark-gray (5Y 4/1) fine sandy loam; weak, medium, granular structure; very friable; very strongly acid; 4 to 8 inches thick; gradual, wavy boundary.
- B<sub>1R</sub> 11 to 16 inches, dark-gray (5Y 4/1) sandy clay loam faintly mottled with light olive brown (2.5Y 5/4); weak, medium, subangular blocky structure; friable, slightly sticky when wet; very strongly acid; 3 to 6 inches thick; gradual, wavy boundary.
- B<sub>21R</sub> 16 to 22 inches, gray (5Y 5/1) sandy clay; many, prominent mottles of yellowish brown (10YR 5/6) and a few, faint mottles of dark red (10R 3/6); weak, coarse, angular blocky structure to massive; firm; very strongly acid; 6 to 10 inches thick; gradual, wavy boundary.
- B<sub>22R</sub> 22 to 53 inches, gray (5Y 5/1) sandy clay reticulately mottled with dark red (10R 3/6) and yellowish brown (10YR 5/6); the number of red mottles increases with increasing depth, and the brown mottling fades out; weak, coarse, angular blocky structure to massive; firm, but mottled material is brittle and grainy; very strongly acid, 24 to 36 inches thick.
- D 53 inches +, mottled dark-red (2.5YR 3/6) and grayish-brown (2.5Y 5/2) sandy loam or loamy sand; a few lumps of gray clay; in places the soil material is structureless, and in other places the structure varies; very strongly acid.

## Dunbar Series

The Dunbar series consists of acid soils that are somewhat poorly drained. The soils are on low knolls or on the level parts of ridges. They are within broad areas of more poorly drained soils. The soils have formed in medium-textured materials on low marine terraces. The surface horizon ranges in color from dark gray to black or grayish brown. The soils are underlain by mottled, yellowish-brown sandy clay loam over gray clay.

These soils are naturally low in fertility. They are medium to low in content of organic matter.

The Dunbar soils are associated with the Weston, Bladen, Plummer, Eulonia, Fairhope, and Ona soils. They are better drained and less gray than the Weston, Bladen, and Plummer soils. They have more sand in the upper part of the profile than the Bladen soils. The Dunbar soils occur in lower positions and are wetter than the Eulonia and Fairhope soils, and their B horizon is mottled. They consist of less sandy materials than the Ona soils. The Dunbar soils also lack the organic layer in the upper B horizons that is typical of the Ona soils.

The vegetation is chiefly a mixed stand of pines. Only one soil of this series—Dunbar fine sandy loam, 0 to 2 percent slopes—occurs in this county.

**Dunbar fine sandy loam, 0 to 2 percent slopes (DmA).**—This somewhat poorly drained, medium-textured soil is on low knolls or small rises. The total acreage is rather small, but there are a few fairly large areas, all in the central and western parts of the county. The following describes a profile in a moist, wooded area 1 mile east of the junction of U.S. Highway No. 17 and State Highway No. 99, north of the road.

- A<sub>1</sub> 0 to 3 inches, black (N 2/0) fine sandy loam; weak, fine, granular structure; very friable, sticky when wet; strongly acid; 0 to 4 inches thick; abrupt boundary.



- A<sub>2</sub> 3 to 9 inches, grayish-brown (10YR 5/2) fine sandy loam faintly mottled with yellowish brown (10YR 5/4); fine, subangular blocky structure; very friable, sticky when wet; very strongly acid; 4 to 8 inches thick; gradual, smooth boundary.
- B<sub>1g</sub> 9 to 16 inches, yellowish-brown (10YR 5/6) sandy clay loam; mottles of grayish brown (2.5Y 5/2) and a few, fine to medium mottles of strong brown (7.5YR 5/6); moderate, medium, angular blocky structure; friable, sticky when wet; very strongly acid; 6 to 10 inches thick; gradual, smooth boundary.
- B<sub>21g</sub> 16 to 21 inches, gray (10YR 6/1) fine sandy clay; prominent mottles of grayish brown (2.5Y 5/2) and common, medium mottles of red (2.5YR 4/8); moderate, medium, angular blocky structure; slightly firm, very sticky when wet; very strongly acid; 4 to 8 inches thick; gradual, smooth boundary.
- B<sub>22g</sub> 21 to 31 inches, gray (N 5/0) clay; many, medium, prominent mottles of dark red (2.5YR 3/6) and medium, prominent mottles of yellowish brown (10YR 5/6); firm, very sticky when wet; extremely acid; 6 to 16 inches thick; gradual, smooth boundary.
- C<sub>g</sub> 31 to 47 inches +, gray (10YR 5/1) fine sandy clay; many, medium, prominent mottles of dark red (2.5YR 3/6) and common, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, medium, angular blocky structure; firm, sticky when wet; extremely acid.

In areas that have been cultivated, the surface layer is grayish brown. The B<sub>1g</sub> horizon ranges in texture from sandy clay loam to fine sandy loam, and the B<sub>22g</sub> horizon, from clay to fine sandy clay loam.

Included with this soil are areas of Bladen-Coxville sandy loams and of Weston loamy fine sand that were too small to map separately.

Dunbar fine sandy loam, 0 to 2 percent slopes, is low in natural fertility. It is medium to low in content of organic matter. Surface runoff is slow, and permeability is moderately slow. The moisture-supplying capacity is moderate. The soil has a thick root zone and good tilth. It responds well to management, and yields are generally good.

Most of this soil is in pine forests. A few of the larger areas have been cleared and are used for pasture, corn, and vegetables. The soil is wet in spring. As a result, it warms slowly and planting is often delayed. (Capability unit IIw-3; woodland group 2; range site, Bladen Flatwoods.)

## Dune Land

**Dune land (Dsl).**—This miscellaneous land type occurs along the seaward side of Sapelo and Blackbeard Islands. It consists of deep, barren, white sands. Some areas that are inland from the sea are partially stabilized by vegetation.

Dune land occupies the higher sand ridges, both inland and adjacent to the beaches. The ridges run parallel to the beaches and are along the eastern side of the islands. They have short, steep, abrupt side slopes. The crests of the ridges are tilted inland because of the prevailing easterly winds. Areas of Dune land are very droughty and in places are slightly alkaline.

In areas where Dune land is becoming stabilized, there is sparse vegetation consisting of waxmyrtle, dwarfed pine, cedar, scrub oak, and thin grasses. Many of the trees are shaped grotesquely because they have been blown by violent winds during periods of turbulent weather. (Capability unit VIIIIs-1.)

## Eulonia Series

The Eulonia series consists of moderately well drained, strongly acid soils that are nearly level to very gently sloping. The soils have developed in a thin deposit of sandy loam that overlies clay or sandy clay. They are on low marine terraces. Typically, the surface horizon is very dark gray or black fine sandy loam. The upper part of the subsoil is yellowish-brown sandy clay loam over grayish-brown sandy clay to clay.

These soils are low in fertility. They are also low in organic matter.

The Eulonia soils are associated with Fairhope, Coxville, Dunbar, and Bladen soils. They are less red and brown than the Fairhope soils and have a coarser textured subsoil. They are better drained than the Coxville and the Dunbar soils, and their subsoil is more yellowish. The upper part of their profile is coarser textured than that of the Coxville soils. The Eulonia soils are better drained and have horizons more distinct than those of the Bladen soils.

The natural vegetation is mainly longleaf and slash pines, but it includes sweetgum, southern red oak, post oak, palmetto, gallberry, and wiregrass.

The Eulonia soils are not mapped separately in this county but are mapped with the Fairhope soils. A typical profile of a Fairhope fine sandy loam is described under the Fairhope series.

**Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes (EoA).**—In places the Eulonia and Fairhope soils are intricately mixed; individual areas are so small that the soils are not mapped separately. The Eulonia soils occupy about 75 percent of this acreage. The soils are in the central and western parts of the county. They are on small knolls or on the nearly level parts of ridges. The soils are moderately well drained and are strongly acid.

A typical profile of a Fairhope fine sandy loam is described under the Fairhope series. The following describes a typical profile of a Eulonia fine sandy loam 1 mile east of Eulonia and 500 feet north of State Highway No. 99.

- A<sub>11</sub> 0 to 4 inches, black (10YR 2/1) fine sandy loam; weak, fine, granular structure; very friable when moist, nonsticky when wet; strongly acid; 3 to 5 inches thick; clear, wavy boundary.
- A<sub>12</sub> 4 to 7 inches, dark grayish-brown (10YR 4/2) to brown (10YR 5/3) fine sandy loam; structureless; loose when moist, nonsticky when wet; strongly acid; 2 to 4 inches thick; clear, smooth boundary.
- A<sub>2</sub> 7 to 11 inches, light yellowish-brown (10YR 6/4) very fine sandy loam; weak, fine, granular structure; very friable when moist, slightly sticky when wet; strongly acid; 3 to 5 inches thick; gradual, irregular boundary.
- B<sub>2</sub> 11 to 18 inches, yellowish-brown (10YR 5/4 to 5/6) sandy clay loam; a few, small, iron concretions that are hard in the center; moderate, medium, subangular blocky structure; friable when moist, sticky when wet; strongly acid; 4 to 10 inches thick; clear, smooth boundary.
- B<sub>3b</sub> 18 to 24 inches, grayish-brown (10YR 5/2) clay; many medium, distinct mottles of dark brown (7.5YR 4/4); a few, soft, iron concretions that are dark brown (7.5YR 3/2) inside; strong, medium, subangular blocky structure; firm when moist, very sticky when wet; strongly acid; 4 to 10 inches thick; gradual, irregular boundary.

- C<sub>1</sub> 24 to 34 inches, gray (10YR 5/1) clay; many, prominent, coarse mottles of red (2.5YR 4/6) and brownish yellow (10YR 6/8); small, columnar structure; breaking to strong, medium, angular blocky structure; firm when moist, slightly sticky when wet; strongly acid; 8 to 12 inches thick; clear, wavy boundary.
- C<sub>2</sub> 34 to 48 inches, grayish-brown (2.5Y 5/2) sandy clay loam prominently mottled with brown (10YR 5/3) and red (2.5YR 4/8); moderate, medium, subangular blocky structure; very friable when moist, slightly sticky when wet; strongly acid.

In a few areas the texture of the surface layer is loamy fine sand. The subsoil ranges in texture from sandy clay loam to clay, and, in a few areas, it is clay loam.

Included with these soils is a small acreage of Eulonia and Fairhope soils in which slopes are 2 to 5 percent. Also included in the mapping units are areas of Eulonia-Fairhope loamy fine sands, thick surfaces, and of Dunbar fine sandy loams that were too small to map separately.

Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes, are low in natural fertility and in content of organic matter. Surface runoff is medium, and permeability is moderately slow. The soils are moderate in moisture-supplying capacity.

Most of the acreage is wooded. The present natural vegetation is largely longleaf pine, slash pine, sweetgum, oak, palmetto, and wiregrass. A few fairly large areas of these soils, mainly near Eulonia and along the Briardam Road south of Townsend, are used for cultivated crops, principally corn and vegetables. Because of their good tilth, thick root zone, and ability to respond to good management, the soils are well suited to moderately intensive use. (Capability unit IIe-3; woodland group 1; range site, Bladen Flatwoods.)

**Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes (EpA).** The soils in this mapping unit have a thick, sandy A horizon that extends to a depth of 18 to 30 inches. The surface layer dries out more rapidly than that of Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes. In cultivated areas the surface layer is gray.

Included with these soils are areas of Eulonia-Fairhope fine sandy loams and of Lynchburg loamy fine sands. These were too small to map separately.

Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes, have moderate moisture-supplying capacity and permeability. They have good tilth and a thick root zone, respond well to management, and can be cropped intensively.

These soils are largely in woods. A few areas are pastured or are used for corn or vegetables. (Capability unit IIe-3; woodland group 1; range site, Bladen Flatwoods.)

**Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes (EpB).** These soils have a thick, sandy A horizon. The surface layer dries out more rapidly than that of Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes. The soils are mainly in the central part of the county. They are conspicuously located on the higher knolls and on ridges that have short, gentle slopes.

These soils are moderate in moisture-supplying capacity. They are low in fertility, but they have a thick root zone. Tilth is good.

Nearly all of the acreage is in mixed pine forest. A small acreage is used for corn, potatoes, beans, and pasture. (Capability unit IIe-3; woodland group 1; range site, Bladen Flatwoods.)

## Fairhope Series

The Fairhope series consists of moderately well drained, strongly acid soils in coastal areas. The soils are nearly level to very gently sloping and range in slope from 0 to 5 percent. They have formed in beds of heavy clay or fine sandy clay on low marine terraces.

The surface layer is black or very dark gray fine sandy loam. The subsoil is dark-brown to reddish-brown clay over olive-gray clay to fine sandy clay. In many places there are small iron concretions in the profile.

These soils are low in fertility. They contain little organic matter.

The Fairhope soils are associated with Eulonia, Bladen, Coxville, Dunbar, and Weston soils. They are better drained than the Eulonia soils, and their subsoil is less yellowish. The Fairhope soils are better drained and have more distinct horizons than the Bladen, Coxville, Dunbar, and Weston soils. They lack the lenses of sand that are common in the profile of the Weston soils.

The Fairhope soils are mainly in the central part of the county. In places they occur in intricate mixtures with the Eulonia soils, and the soils of the two series are mapped together because the areas are too small to map separately.

These soils are largely in woods. The natural vegetation is chiefly longleaf pine, slash pine, sweetgum, southern red oak, and post oak. There are a few scattered palmettoes and gallberry bushes and a few patches of wiregrass. The soils respond well to management, and good yields are obtained.

**Fairhope fine sandy loam, 2 to 5 percent slopes (FpB).**—This deep, moderately well drained soil is medium acid. It is on small knolls and on the gently sloping sides of ridges. The following describes a profile in a moist, cutover, wooded area 1 mile east of the crossroads of U.S. Highway No. 17 and State Highway No. 99, on the north side of State Highway No. 99, approximately 300 feet east of drainage ditch.

- A<sub>1</sub> 0 to 5 inches, black (N 2/0) fine sandy loam; weak to moderate, fine, granular structure; loose when moist, nonsticky when wet; medium acid; 0 to 7 inches thick; gradual, irregular boundary.
- A<sub>2</sub> 5 to 9 inches, grayish-brown to light olive-brown (2.5Y 5/2 to 5/4) very fine sandy loam; wormholes in uppermost 3 inches filled with soil material from A<sub>1</sub> horizon; weak, fine subangular blocky structure; very friable when moist, nonsticky when wet; medium acid; 2 to 6 inches thick; clear, smooth boundary.
- B<sub>21</sub> 9 to 16 inches, dark-brown (7.5YR 4/4) clay loam; a few, fine, prominent mottles of grayish brown (2.5Y 5/2); moderate, medium, subangular blocky to angular blocky structure; friable when moist, sticky and plastic when wet; very strongly acid; 4 to 9 inches thick; gradual, smooth boundary.
- B<sub>22</sub> 16 to 24 inches, dark yellowish-brown (10YR 4/4) clay; many, coarse, prominent mottles of olive gray (5Y 5/2); moderate, fine to medium, angular blocky structure; slightly firm when moist, sticky and very plastic when wet; very strongly acid; 6 to 10 inches thick; gradual, smooth boundary.
- B<sub>3</sub> 24 to 32 inches, olive-gray (5Y 5/2) clay; many, coarse, prominent mottles of dark red (2.5YR 3/6); weak to moderate, medium, angular blocky to subangular blocky structure; sticky and very plastic; very strongly acid; 7 to 12 inches thick; gradual, smooth boundary.
- C<sub>1</sub> 32 to 47 inches, gray (5Y 5/1) clay; many, coarse, prominent mottles of dark reddish brown (5YR 3/4); weak to moderate, fine and medium, angular blocky

- structure; sticky and very plastic; very strongly acid; 10 to 15 inches thick; gradual, smooth boundary.
- C<sub>2</sub> 47 to 60 inches, gray (5Y 6/1) clay; many, coarse, prominent mottles of strong brown (7.5YR 5/6) and dark reddish brown (5YR 3/2); weak to moderate, fine, blocky structure; friable to slightly firm when moist, sticky to very plastic when wet; extremely acid; 18 to 24 inches thick; gradual, smooth boundary.
- C<sub>3</sub> 60 to 69 inches, gray (5Y 6/1) clay; many, coarse, prominent mottles of strong brown (7.5YR 5/6) and dark reddish brown (5YR 3/2); weak to moderate, fine, blocky structure; friable to slightly firm when moist, sticky to very plastic when wet; extremely acid.

In a few areas the texture of the surface layer is sandy loam. In areas that have been cultivated, the surface layer is gray. The subsoil ranges in texture from clay to sandy clay loam, and, in color, from dark brown or dark yellowish brown to olive gray mottled with dark red.

The moisture-supplying capacity is moderate in this soil, and permeability is moderately slow. The soil has good tilth and a thick root zone. It responds well to management and can be cropped intensively.

Most of this soil is in woods. A small acreage is in corn, vegetables, and improved pasture. (Capability unit IIe-3; woodland group 1; range site, Bladen Flatwoods.)

### Galestown Series

The Galestown series consists of deep, somewhat excessively drained soils that are strongly acid. The soils have formed in marine sands. They are on nearly level or gently sloping ridges. The areas are on the Coastal Plain near the sea. The surface layer is sandy and is very dark gray to dark reddish brown. It overlies yellowish-brown, structureless sands that are free of mottles to a depth of 18 inches or more. The underlying material is mottled, varicolored sands.

These soils are low in fertility. They contain little organic matter.

The Galestown soils are associated with Ona, Klej, and Palm Beach soils. They are better drained than the Ona soils, and their surface layer is generally lighter colored. They lack the zone of dark-brown, friable, organic-stained material that is just below the surface layer in the typical Ona soils. The Galestown soils are better drained and generally occur in higher positions than the Klej soils. They resemble the Palm Beach soils closely, but the Palm Beach soils are darker in color and contain many seashells.

The present vegetation is chiefly loblolly pine, longleaf pine, slash pine, live oak, cedar, post oak, and waxmyrtle, but there are a few hickory trees. Only one soil of this series—Galestown fine sand, 0 to 2 percent slopes—occurs in this county.

**Galestown fine sand, 0 to 2 percent slopes (GrA).**—This somewhat excessively drained soil is on the gentle slopes of ridges. It occurs from Darien northeastward along the eastern shores. Small areas are also on Sapelo Island and on islands in the swamp along the Altamaha River southeast of Cox. The following describes a profile in a moist, sparsely wooded area 1 mile east of U.S. Highway No. 17, on the south side of a graded road to Meridian, southwest of a large borrow pit in a pine thicket.

- A<sub>p</sub> 0 to 7 inches, very dark gray (10YR 3/1) fine sand; weak, fine, granular structure; strongly acid; 5 to 8 inches thick; clear, wavy boundary.
- C<sub>1</sub> 7 to 12 inches, yellowish-brown (10YR 5/4) fine sand, mixed and streaked with soil from the A<sub>p</sub> horizon;

very weak, granular structure; strongly acid; 8 to 14 inches thick; gradual, smooth boundary.

- C<sub>2</sub> 12 to 29 inches, yellowish-brown (10YR 5/4) fine sand; structureless; very strongly acid; 15 to 20 inches thick; gradual, smooth boundary.
- C<sub>3</sub> 29 to 44 inches, yellowish-brown (10YR 5/6) fine sand; structureless; common, medium, faint mottles of strong brown (7.5YR 5/6) that increase in number with increasing depth to many, coarse, and prominent; very strongly acid; 12 to 18 inches thick; gradual, smooth boundary.
- C<sub>4</sub> 44 to 51 inches +, yellowish-brown (10YR 5/4) fine sand; structureless; common, medium, prominent mottles of yellowish red (5YR 5/8); very strongly acid; free water in this layer.

In a few areas near Bellville Point, the surface layer is dark brown. In broad, nearly level areas, the water table is higher in the soil than in more undulating areas. Mottles are also nearer the surface. In many wooded areas the profile commonly contains one or more subsurface layers. There are spoil areas of seashells near places where houses have been built.

Mapped with this soil are small areas of Klej fine sands, Palm Beach fine sands, and Lakeland sands that were too small to delineate separately. A small acreage of Galestown fine sand with slopes of 2 to 5 percent is also included with this soil.

Galestown fine sand, 0 to 2 percent slopes, warms up early in spring and is easily cultivated. Permeability is very rapid, and the soil is rather droughty. The soil responds fairly well to fertilization and to other management practices.

Early in the 19th century, sea-island cotton was grown extensively on this soil. Now, most of the acreage is in trees. The soil material is desirable for road fill, and many borrow pits are located near roads. (Capability unit IIIs-2; woodland group 5; range site, Coastal Hammock.)

### Klej Series

The Klej series consists of moderately well drained, strongly acid soils of the Coastal Plain. The soils are nearly level. They have formed on marine terraces in thick, sandy materials where the water table was high. The surface and subsurface layers are dark-gray to dark grayish-brown fine sand. The underlying layers are made up of light yellowish-brown to olive-yellow fine sand or sand. The materials below the surface layer are distinctly mottled. The soils lack a clayey subsoil.

These soils are low in natural fertility. They contain little organic matter.

The Klej soils are associated with Galestown, Ona, and Rutlege soils. In places they occur near Leon soils. They are in lower positions than those occupied by the Galestown soils, and, in the layers below the surface layer, they lack the yellowish-brown color that is typical of the Galestown soils. The Klej soils also lack the dark-brown color in the A horizons and the brown, friable, organic materials in the subsurface layer that are typical of the Ona soils. They are better drained than the Rutlege soils. The Klej soils are unlike the Leon soils in that the Leon soils have a hard, or cemented, layer in the profile.

The natural vegetation is mainly oaks and mixed pines, but there are a few hickory trees and palmetto, gallberry, and myrtle bushes. Only one soil of this series—Klej fine sand, 0 to 2 percent slopes—occurs in this county.

The areas are all small and are intermixed with areas of associated soils.

**Klej fine sand, 0 to 2 percent slopes (KfA).**—This soil is very sandy and is moderately well drained. It occurs throughout the county and is in small, widely scattered areas, intermixed with areas of associated soils. The soils are on the nearly level parts of low ridges. A large acreage is in the eastern part of the county. The following describes a profile in a moist, wooded area 3.2 miles east of South Newport on the north side of State Highway No. 131.

- A<sub>11</sub> 0 to 4 inches, dark-gray (N 4/0) fine sand; loose; structureless; strongly acid; 3 to 5 inches thick; abrupt, wavy boundary.
- A<sub>12</sub> 4 to 8 inches, dark grayish-brown (2.5Y 4/2) fine sand; loose; structureless; strongly acid; 3 to 5 inches thick; abrupt, wavy boundary.
- C<sub>1</sub> 8 to 20 inches, light yellowish-brown (2.5Y 6/4) fine sand; loose; structureless; strongly acid; 10 to 16 inches thick; gradual, wavy boundary.
- C<sub>2</sub> 20 to 30 inches, light yellowish-brown (2.5Y 6/4) fine sand; fine, distinct mottles of light gray (2.5Y 7/2) and pale yellow (2.5Y 8/4); loose, structureless; strongly acid; 8 to 12 inches thick; abrupt, wavy boundary.
- C<sub>3</sub> 30 to 42 inches, olive-yellow (2.5Y 6/6) fine sand; moderate, medium, distinct mottles of pale yellow (2.5Y 7/4) and yellowish brown (10YR 5/6); loose; structureless; strongly acid; 10 to 16 inches thick; gradual, wavy boundary.
- D 42 to 50 inches +, gray (N 5/0) sandy loam; moderate, medium, distinct mottles of yellowish brown (10YR 5/6) and red (2.5YR 4/8); friable; weak, medium, subangular blocky structure; very strongly acid; this layer varies in thickness.

In a few areas the surface layer has a texture of very fine sand, and in a few places its color is dark grayish brown. There are weak stains just below the surface layer in some areas. In areas where this soil is in higher positions than typical, it has characteristics similar to those of the Galestown soils. In places where it is less well drained than the normal soil, it has characteristics similar to those of the Ona soils.

Included with this soil are areas of Ona fine sands, Blanton fine sands, and Galestown fine sands. These areas were too small to map separately.

Klej fine sands, 0 to 2 percent slopes, is low in natural fertility and in organic matter. There is little surface runoff, and permeability is rapid. The moisture-supplying capacity is low. The soil has a thick root zone and good tilth. It is cultivated easily but is rather wet late in winter and in spring. The water table falls sharply late in spring, and the soil is rather droughty in summer. Most of the acreage is in trees. A few areas have been farmed but are now idle, and only a few areas are used for gardens. (Capability unit IVw-3; woodland group 3; range site, Sandy Flatwoods.)

## Lakeland Series

The Lakeland series consists of deep, excessively drained, very strongly acid soils of the Coastal Plain. These soils are on sand ridges of the island and on the mainland. They are nearly level to sloping. The soils have formed in beds of sand. They commonly have a gray, sandy surface layer that overlies pale-yellow to brownish-yellow sandy materials.

These soils are low in natural fertility. Their content of organic matter is low.

The Lakeland soils are associated with Galestown, Ona, Klej, Plummer, and Lakewood soils. They resemble the Galestown soils closely, but the Galestown soils have a yellowish-brown C horizon rather than a C horizon that is olive yellow. The Lakeland soils are better drained, have a lighter colored surface layer, and are in higher positions than the Ona, Klej, and Plummer soils. They lack the zone of dark-brown, friable organic matter that has accumulated in the subsoil of the Ona soils. Unlike the Klej and Plummer soils, they are commonly free of mottles to a depth of 30 inches. The Lakeland soils have a more yellowish C horizon than the Klej and Plummer soils, and they lack the thick, white A horizon typical of the Lakewood soils.

The small, scattered ridges on which the Lakeland soils lie are conspicuous and occur throughout the county. On Blackbeard Island and along the western boundary of the county, there are a few fairly large areas of these soils. The present natural vegetation is chiefly bluejack oak, turkey oak, live oak, and longleaf pine, but there are a few scattered saw-palmettoes.

These soils are droughty and are only fairly well suited to farming. Most of the acreage is in forest. A few areas are used for agriculture and are mainly in pasture.

**Lakeland sand, 0 to 2 percent slopes (LpA).**—This deep, excessively drained soil is nearly level to gently sloping. It occurs on ridges. The following describes a profile in a moist, sparsely wooded area 2.5 miles east and 2 miles north of Cox on the east side of the county road:

- A<sub>1</sub> 0 to 5 inches, gray (10YR 5/1) sand; single grain; loose; extremely acid; abrupt, wavy boundary; 2 to 7 inches thick.
- Color B 5 to 13 inches, light yellowish-brown (10YR 6/4) sand; single grain; loose; very strongly acid; gradual, wavy boundary; 7 to 10 inches thick.
- C<sub>1</sub> 13 to 18 inches, pale-yellow (2.5Y 7/4) sand; single grain; loose; extremely acid; gradual, smooth boundary; 4 to 20 inches thick.
- C<sub>2</sub> 18 to 50 inches +, pale-yellow (5Y 7/3) sand; single grain; loose; extremely acid.

In areas that have been cultivated, the surface layer is light gray. The texture of the surface layer ranges from fine sand to sand. The substratum ranges from fine sand to sand in texture and from pale yellow to brownish yellow in color. In a small acreage of this soil, the slopes are between 2 and 5 percent.

Included with this soil are areas of Klej fine sands that were too small to map separately. Also included are small areas of Blanton fine sands.

Lakeland sand, 0 to 2 percent slopes, is low in natural fertility and in content of organic matter. Permeability is rapid and surface runoff is slow. The soil has a deep root zone and good tilth, but it is low in water-supplying capacity. Most of the acreage is covered by a sparse stand of trees. (Capability unit IIIs-2; woodland group 5; range site, Coastal Hammock.)

**Lakeland sand, 5 to 8 percent slopes (LpC).**—This soil has stronger slopes and is more droughty than Lakeland sand, 0 to 2 percent slopes. Most of it is on Blackbeard Island. The soil is on low, narrow ridges that have short, choppy side slopes. The ridges run parallel and are separated by depressions occupied by poorly drained sands.

Included with this soil are areas of Galestown fine sand, 5 to 8 percent slopes, which is not mapped separately.

in this county. These areas were too small to delineate separately.

All of Lakeland sand, 5 to 8 percent slopes, is wooded. It is covered mainly by small live oaks and by a dense stand of palmettoes on the ridges of Blackbeard Island. (Capability unit IVs-1; woodland group 5; range site, Coastal Hammock.)

**Lakeland coarse sand, deep, 2 to 5 percent slopes (LwB).**—This soil has a rather thin A horizon, which is generally browner than that in Lakeland sand, 0 to 2 percent slopes. The particles of sand are uniformly coarse throughout the profile. The soil is underlain by coarse sand that is as much as 20 to 30 feet thick in many places.

Lakeland coarse sand, deep, 2 to 5 percent slopes, occurs only on a rolling sand ridge that extends along the western boundary of the county. It is the dominant soil on the northern part of the ridge, and it is on the smooth crest in other parts of the ridge. In the areas where this soil occurs, the depth to the water table is less than in other parts of the sand ridge. In most places the slopes are very gentle, but in a small acreage they are as much as 8 percent. Trails and paths follow many of the gentle slopes.

This soil is extremely droughty and is low in fertility. The vegetation growing on it differs markedly from that on the adjoining poorly drained soils. All of the acreage is thinly wooded. (Capability unit VIIs-1; woodland group 9; range site, Scrub Oak Sand Ridge.)

**Lakeland coarse sand, deep, 5 to 12 percent slopes (LwC).**—This soil, like Lakeland coarse sand, deep, 2 to 5 percent slopes, is on the sand ridge in the western part of the county. It has stronger slopes and occurs at higher elevations than other soils in the county. There are a few bluffs in some areas. The coarse sands underlying this soil extend to depths of many feet and are uniformly brownish yellow.

Included with this soil are a few areas of Lakewood soils on toe slopes. These areas were too small to map separately.

Lakeland coarse sand, deep, 5 to 12 percent slopes, is low in fertility and is extremely droughty in summer. Plants make little growth on it. The sparse growth of vegetation consists mainly of bluejack oaks and turkey oaks, but there are a few longleaf pines and scattered grasses. (Capability unit VIIs-1; woodland group 9; range site, Scrub Oak Sand Ridge.)

## Lakewood Series

The Lakewood series consists of deep, excessively drained, sandy soils that are very strongly acid. The soils are on sand ridges adjacent to large streams. They have formed in beds of sand. The slopes are mainly between 5 and 8 percent, but the soils on the tops of the ridges have milder slopes.

The surface layer consists of gray to white sand. It overlies a thin, brown to dark-brown layer in which organic matter has accumulated. The underlying soil material is yellowish-brown sand.

These soils are low in fertility and in content of organic matter. Their moisture-holding capacity is low.

The Lakewood soils are associated with deep Lakeland coarse sands and with Plummer soils and are also near areas of Swamp. They are less droughty and less hummocky than the Lakeland soils. In addition, the Lake-

wood soils are gray or white to a depth of more than 30 inches, and the deep Lakeland coarse sands are yellow or yellowish brown to a depth of 50 inches or more. The Lakewood soils are in higher positions and are better drained than the Plummer soils and Swamp.

These soils are too droughty for crops. The present vegetation is mainly live oak, bluejack oak, hickory, spruce pine, and ironwood, but it includes scattered magnolia trees, saw-palmettoes, and a few pines. Only one soil of this series—Lakewood coarse sand, thick surface, 5 to 8 percent slopes—occurs in this county.

**Lakewood coarse sand, thick surface, 5 to 8 percent slopes (LxC).**—This excessively drained soil is very sandy. It is on gently sloping sand ridges, adjacent to and on the islands in the swamp along the Altamaha River, south and west of Cox. The largest single area is on a ridge that runs along the western boundary of the county. The following describes a profile in a moist, wooded area 2.5 miles west of Cox and 0.25 mile north of Harper Lake.

- A<sub>0</sub> 1 to 0 inch, gray (N 5/0), loose, partly decomposed forest litter of leaves and twigs from live oaks; very strongly acid; 0 to 1 inch thick; abrupt boundary.
- A<sub>2</sub> 0 to 32 inches, white (N 8/0) coarse sand; single grain; loose; extremely acid; 30 to 42 inches thick; abrupt, smooth boundary.
- B<sub>h</sub> 32 to 38 inches, dark-brown (10YR 4/3) coarse sand that contains accumulated organic matter; single grain; loose; extremely acid; 2 to 6 inches thick; abrupt, smooth boundary.
- C 38 to 54 inches +, yellowish-brown (10YR 5/8) coarse sand; single grain; loose; extremely acid.

In places, where this soil adjoins areas of deep Lakeland coarse sands, its A<sub>2</sub> horizon is 18 to 30 inches thick. In most areas, however, the A<sub>2</sub> horizon is more than 30 inches thick. The B<sub>h</sub> horizon ranges from dark brown to yellowish brown in color and is loose to slightly firm. In a few of the areas on gently sloping ridgetops, the B<sub>h</sub> horizon is lacking.

This soil is very low in fertility and in content of organic matter. Its moisture-holding capacity is low. The soil is too droughty for agricultural crops, and all of the acreage is wooded. (Capability unit VIIs-1; woodland group 9; range site, Scrub Oak Sand Ridge.)

## Leon Series

The Leon series consists of somewhat poorly drained to poorly drained soils that are extremely acid. The soils have slopes of less than 3 percent. They have formed in beds of sand in areas where the water table was high but fluctuating.

The surface layer is gray or peppery white and overlies a leached A<sub>2</sub> horizon. The B<sub>2n</sub> horizon is made up of dark-colored sandy material that in most places is firm or cemented with organic matter. The firm layer becomes hard as the soil dries. It restricts permeability, and free water is often held above it. The firm, or cemented, layers that are brown are more strongly cemented than those that are black. In a few places there are several cemented layers in the soil.

These soils are highly leached. They are low in fertility.

The Leon soils are associated with Ona, St. Johns, Rutlege, and Plummer soils. They have a thinner surface layer than the Ona soils, and their surface layer is a lighter gray. Their surface layer is lighter colored



than that of the St. Johns soils. The Leon soils are better drained than the St. Johns, Rutlege, and Plummer soils. The associated soils do not have a cemented layer.

The natural vegetation consists mainly of longleaf pine and pond pine. The trees are scattered among low palmettoes (fig. 4), gallberries, runner oaks, and patches



Figure 4.—Palmettoes growing on Leon fine sand.

of wiregrass. Deerstongue, or vanillaleaf (*Trilisa odoratissima*), a plant that is important economically, grows well on this soil. Only one soil of this series—Leon fine sand—occurs in this county.

**Leon fine sand** (0 to 2 percent slopes) (LrA).—This somewhat poorly drained to poorly drained sandy soil occurs on low hillocks and on the nearly level tops of low ridges. Large areas occur north and east of Darien, and many small areas are scattered throughout the county. The following describes a profile in a moist, wooded area 4.4 miles north of Darien and 0.25 mile east of U.S. Highway No. 17 on the School Plot Road.

- A<sub>1</sub> 0 to 2 inches, very dark gray (N 3/0) fine sand; weak, fine, granular structure or single grain; loose; extremely acid; 1 to 5 inches thick; abrupt, wavy boundary.
- A<sub>2</sub> 2 to 13 inches, gray (N 6/0) fine sand; weak, fine, granular structure or single grain; loose; extremely acid; 6 to 20 inches thick; abrupt, irregular boundary.
- B<sub>2h</sub> 13 to 20 inches, reddish-black (10R 2/1) fine sand, dark grayish brown (10YR 4/2) in lower part;

weakly cemented with organic matter; firm; extremely acid; 4 to 12 inches thick; gradual, wavy boundary.

- B<sub>3</sub> 20 to 36 inches, light olive-brown (2.5Y 5/4) fine sand; many, medium, prominent mottles of gray (N 6/0) and reddish brown (5YR 4/4); weak, fine, granular structure or single grain; loose; extremely acid; 4 to 20 inches thick; gradual, irregular boundary.

- C 36 to 52 inches  $\tau$ , black (5YR 2/1) fine sand; weak, fine, granular structure or single grain; loose; extremely acid.

In a few areas the surface layer is medium sand rather than fine sand. In other areas it is a rather coarse sand mixed with finer particles. In a few areas the material in the B<sub>2h</sub> horizon is friable. The B<sub>2h</sub> horizon ranges from several inches to more than a foot in thickness. In areas where Leon fine sand occurs on low hillocks surrounded by finer textured soils, as in the central and western parts of the county, it is underlain by clayey materials. In these areas the firm, or cemented, layer directly overlies these clayey materials.

Included with this soil are small areas of Ona, Plummer, Rutlege, and St. Johns soils that were too small to map separately. The Ona soils occur at slightly higher elevations than the Leon soils, and the Plummer, Rutlege, and St. Johns soils are in small depressions.

Leon fine sand has little value for agriculture. A few small areas are used for gardens, and a small acreage is in improved pasture. In the eastern part of the county, a few areas are used as range for cattle. In forested areas the stand is rather thin and the trees grow slowly. The areas on hillocks, where the soils are underlain by clayey materials, are better suited to trees than the broad, flat areas in the eastern part of the county, where the soil is underlain by sand.

Leon fine sand is suitable for road fill. Many borrow pits are within the areas. (Capability unit Vw-4; woodland group 7; range site, Hardpan Flatwoods.)

## Lynchburg Series

The Lynchburg series consists of somewhat poorly drained, very strongly acid soils. The soils are on the nearly level parts of low ridges and have slopes of 0 to 2 percent. They have formed in sandy marine sediments, where the water table fluctuated greatly from time to time. The texture of the surface layer is loamy fine sand.

These soils are low to medium in moisture-holding capacity and in content of organic matter. Permeability is moderate, and the natural fertility is low.

The Lynchburg soils are associated with Dunbar, Ona, Klej, and Weston soils. They are sandier than the Dunbar soils, and they lack the distinct layer, stained with organic matter, that is typical of the Ona soils. The Lynchburg soils, unlike the Klej soils, have a textural B horizon. They are better drained than the Weston soils.

The vegetation consists mainly of pine forests. Only one soil of this series—Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes—occurs in this county.

**Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes** (LuA).—This soil is somewhat poorly drained and is very strongly acid. It occurs on low ridges and on knolls in the central and western parts of the county. The following describes a profile in a moist to wet permanent pasture 1 mile south of the intersection of U.S. Highway No. 17 and State Highway

No. 99, along the State Highway, 400 yards east of the residence of L. C. Townsend.

- A<sub>1</sub> 0 to 7 inches, very dark gray (10YR 3/1) loamy fine sand; weak, fine, granular structure; very friable; very strongly acid; 5 to 8 inches thick; abrupt, smooth boundary.
- A<sub>2</sub> 7 to 21 inches, pale-yellow (5Y 8/3) loamy fine sand; weak, fine, granular structure; very friable; very strongly acid; 8 to 15 inches thick; gradual, wavy boundary.
- A<sub>3</sub> 21 to 28 inches, pale-yellow (5Y 7/3) loamy fine sand; common, medium, distinct mottles of brownish yellow (10YR 6/8) when wet; weak, fine, granular structure; slightly sticky; very strongly acid; 5 to 9 inches thick; gradual, wavy boundary.
- B<sub>u</sub> 28 to 38 inches, reticulately mottled light-gray (10YR 6/1), pale-yellow (2.5Y 7/4), and yellowish-brown (10YR 5/8) sandy clay loam containing a few lenses of fine sand; weak, medium, subangular blocky structure; friable to firm; very strongly acid; 8 to 12 inches thick; abrupt, smooth boundary.
- D<sub>u</sub> 38 to 54 inches +, light-gray to gray (10YR 6/1) clay; many, medium, prominent mottles of strong brown (7.5YR 5/8) and dark red (10R 3/6); massive; very firm; very strongly acid.

In places the A<sub>1</sub> horizon has brownish stains. The depth to the clayey substratum ranges from 30 to 42 inches. In a few areas there are lenses of sand.

Included with this soil are small areas of Dunbar, Klej, Ona, and Weston soils. These areas were too small to map separately.

Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes, is low to medium in moisture-holding capacity. Its permeability is moderate. The water table fluctuates, but it is highest early in spring, and lowest in fall.

Most of the acreage is in forests of slash pine, longleaf pine, and loblolly pine, but there are scattered thickets of small oaks and of gallberry and myrtle. A few large areas just west of Chisholm Swamp are cultivated, and fairly high yields of corn and vegetables are obtained. Some of the areas are in permanent pasture.

This soil responds well to management. In winter and spring some drainage is needed. In drier seasons the soil is slightly droughty. (Capability unit IIw-2; woodland group 2; range site, Bladen Flatwoods.)

## Made Land

**Made land** (Mae).—This miscellaneous land type consists of areas covered by overburden materials. These materials have been dumped along watercourses and navigable channels of tidal areas wherever dredging operations have been carried on. They have been pumped onto adjoining areas of Tidal marsh.

These piles of spoil vary greatly in their composition from place to place. The texture of Made land ranges from fine clay to sand. Gravel occurs in some areas.

Most of the acreage of Made land in the county is along the banks of the Intracoastal Waterway in the Tidal marshes. Such areas are a conspicuous feature of the marshes. In general, they are void of vegetation and have no agricultural value. (Capability unit VIIw-3.)

## Meggett Series

The soils of the Meggett series are poorly drained. They have formed in moderately thin beds of calcareous

clays on low marine terraces. The surface layer is slightly acid, and the subsoil is mildly alkaline. The soils overlie acid clays, which are at a depth of several feet.

In general, these soils are medium in content of plant nutrients, but they are high in calcium. They are low in content of organic matter. The supply of available moisture is high; water stands on the surface during wet periods.

The Meggett soils are associated with Bladen, Coxville, Weston, and Bayboro soils. They resemble the Bladen and Coxville soils closely. The Meggett soils have an alkaline subsoil, however, and overlie marl or other calcareous material; in contrast, the Bladen and Coxville soils are strongly acid throughout. The Meggett soils lack the sand lenses that are typical of the Weston soils. They are better drained than the Bayboro soils, and their surface layer is lighter colored than that of the Bayboro soils.

The natural vegetation is slash pine, longleaf pine, loblolly pine, sweetgum, live oak, water oak, maple, and sawgrass. A few cabbage palms grow on these soils. Only one soil of this series—Meggett loam—occurs in this county.

**Meggett loam** (0 to 2 percent slopes) (MBA).—This poorly drained soil is on broad flats adjacent to very poorly drained depressions. It occurs in small areas in the central and western parts of the county. The following describes a profile in a moist, wooded area 0.5 mile west of Jones Station, on Cowpen Road.

- A<sub>1</sub> 0 to 4 inches, gray (10YR 5/1) loam; weak, fine, granular structure; very friable; slightly acid; 3 to 9 inches thick; abrupt, smooth boundary.
- A<sub>2</sub> 4 to 6 inches, gray (N 6/0) loam; weak, fine, granular structure; very friable; neutral reaction; 1 to 4 inches thick; clear, smooth boundary.
- B<sub>2u</sub> 6 to 22 inches, yellowish-brown (2.5Y 6/4) clay; many, fine, distinct mottles of dark gray (10YR 4/1); strong, medium, angular blocky structure; very firm when moist, very plastic when wet; a few hardened, calcareous pebbles; mildly alkaline; 12 to 18 inches thick; gradual, smooth boundary.
- B<sub>3u</sub> 22 to 30 inches, gray (N 5/0) clay; many, fine, distinct mottles of light olive brown (2.5Y 5/4); strong, medium, angular blocky structure; very firm when moist, very plastic when wet; many hardened, calcareous pebbles; moderately alkaline; 6 to 10 inches thick; gradual, smooth boundary.
- C<sub>u</sub> 30 to 44 inches, gray (5Y 6/1) clay; many, medium, distinct mottles of brownish yellow (10YR 6/6); strong, angular blocky structure; very firm when moist, very plastic when wet; mildly alkaline; 10 to 14 inches thick; gradual, smooth boundary.
- D<sub>u</sub> 44 to 50 inches +, very dark gray (N 3/0) sandy clay loam; common, medium, distinct mottles of greenish gray (5GY 6/1); moderate, medium, subangular blocky structure; friable; reaction neutral.

In many places this soil lacks the thin A<sub>2</sub> horizon. The number of small, whitish, calcareous pebbles in the subsoil varies.

Included with this soil are small areas of Bladen loams and clay loams. These areas were too small to map separately.

Meggett loam is medium in natural fertility and is generally low in organic matter. Surface runoff is slow, and permeability is moderately slow to slow. The moisture-supplying capacity is moderate. The soil has a thick root zone, and tilth is fair to good.

All of this soil is in trees. If the areas were drained adequately and if other good management practices were

used, the soil would be excellent for permanent pasture. Under good management, suitable row crops also make fairly high yields. (Capability unit IIIw-2; woodland group 4; range site, Bladen Flatwoods.)

## Ona Series

The Ona series consists of somewhat poorly drained, strongly acid soils of the lower Coastal Plain. The soils are nearly level. They have formed in sandy materials where the water table was fluctuating but fairly high. They have a dark-gray to very dark brown, sandy surface layer and a thin, friable B horizon of dark-brown sand. The boundary between these two layers is abrupt.

These soils are low in natural fertility. Their content of organic matter is low to medium, except in the dark-brown B<sub>2h</sub> horizon.

The Ona soils are associated with Leon, Klej, and Galestown soils. They lack the leached, gray A<sub>2</sub> horizon that is typical of the Leon soils. Their surface layer is darker than that of the Klej soils. Also, in contrast to the Klej soils, which lack a B horizon, they have a dark-brown subsoil. The Ona soils are in lower positions and have poorer drainage than the Galestown soils. Unlike the Galestown soils, they have a dark, friable subsoil.

The natural vegetation consists mainly of a mixed stand of pine and oak, but it includes palmettoes, gallberries, runner oaks, and myrtle bushes. Vanillaleaf, or deerstongue, grows among the brush on these soils.

In places in this county, the Ona soils are mapped alone. In other places they occur in intricate mixtures with the Scranton soils, and the soils of the two series are mapped together. A typical profile of a Scranton fine sand, alkaline variant, is described under the Scranton series.

**Ona fine sand** (0 to 2 percent slopes) (ObA).—This somewhat poorly drained, very strongly acid soil occurs in rather low areas. The areas are scattered throughout the county. They are more extensive on the nearly level parts of sand ridges north and east of Darien. In the central and western parts of the county, they occur in small areas surrounded by more poorly drained soils. The following describes a profile in a moist, wooded area 3.1 miles east of South Newport on State Highway No. 131 and 0.1 mile south on the Alf Townsend Road.

- A<sub>1</sub> 0 to 6 inches, dark-gray (5Y 4/1) fine sand; single grain; very friable; very strongly acid; 4 to 8 inches thick; abrupt, smooth boundary.
- B<sub>2h</sub> 6 to 11 inches, dark-brown (7.5YR 3/2) fine sand; weak medium, subangular blocky structure; friable; very strongly acid; 3 to 8 inches thick; gradual, wavy boundary.
- B<sub>3</sub> 11 to 19 inches, grayish-brown (2.5Y 5/2) fine sand; fine, olive-colored (5Y 5/3) mottles; structureless; loose; very strongly acid; 6 to 12 inches thick; gradual, wavy boundary.
- C<sub>1</sub> 19 to 28 inches, pale-yellow (5Y 7/4) fine sand; fine mottles of light yellowish brown (2.5Y 6/4); structureless; loose; very strongly acid; 6 to 12 inches thick; gradual, wavy boundary.
- C<sub>2</sub> 28 to 40 inches +, strong-brown (7.5YR 5/8) fine sand; many, prominent mottles of grayish brown (2.5Y 5/2) and pale yellow (5Y 7/4); weak, fine, granular structure or single grain; loose; very strongly acid.

The color of the surface layer ranges from gray to black. In a few places the texture of the surface layer is medium sand. The subsoil is only 2 to 3 inches thick in some

places. Although some of the subsoil is weakly cemented and breaks into small lumps, most of it is friable. The Ona soils in the central and western parts of the county have clayey materials in the substratum. These areas are numerous but are widely scattered. They are on very low knolls, surrounded by more poorly drained soils.

Included with this soil are areas of Klej fine sands and of Leon fine sands that were too small to map separately. Also included are areas of Lynchburg loamy fine sand, thick surface, clayey substratum.

Ona fine sand has good tilth and moderate to rapid permeability. Its moisture-supplying capacity is low.

Nearly all of this soil is in trees. A small acreage is in corn or pasture or is used for home gardens. The soil is rather wet in winter and in spring, but it is fair for agricultural use. Pines grow well on it. Some drainage is needed if the soil is used for cultivated crops, even though the water table falls sharply in summer and the soil is slightly droughty. (Capability unit IIIw-1; woodland group 3; range site, Sandy Flatwoods.)

**Ona and Scranton fine sands, alkaline variants** (0 to 2 percent slopes) (OsA).—The Ona and Scranton soils in this mapping unit are somewhat poorly drained and are slightly acid to alkaline. The soils are along the outer edges of the offshore islands, but the largest acreage is on Sapelo Island. They have formed in marine sands. The surface layer is dark-gray to black fine sand in which there are fragments of shells. It overlies mottled fine sand. The Ona soils in this mapping unit have a weakly developed B horizon that contains humus.

In some places these Ona and Scranton fine sands are associated with small areas of excessively drained Palm Beach soils and with very poorly drained Rutlege soils. In other places they occupy higher positions.

These soils were once used to grow sea-island cotton, indigo, and many kinds of vegetables. Now, much of the cleared acreage is idle. The wooded areas are covered by a forest of loblolly pine, live oak, water oak, cedar, holly, and myrtle. (Capability unit IIIw-1; woodland group 3; range site, Sandy Flatwoods.)

## Palm Beach Series

The Palm Beach series consists of deep, excessively drained soils that are neutral to mildly alkaline. The soils are on the nearly level parts of sand ridges. In many places the soils terminate at bluffs, approximately 25 feet high, that slope sharply to areas of Tidal marsh. The soils have formed in marine sands that are adjacent to tidal rivers in coastal areas. The surface layers consist of very dark grayish-brown or black fine sand and contain fragments of shells. The underlying material is olive-brown fine sand that extends to a depth of several feet.

These soils are medium in content of organic matter. They are low in most plant nutrients. Because of the shells in the profile, however, they are high in calcium and magnesium and have a nearly alkaline reaction.

The Palm Beach soils are associated with Galestown, Ona, Plummer, and Klej soils and lie next to areas of Tidal marsh. They are more alkaline than the Galestown and Ona soils and contain shells, which generally are lacking in the Galestown and Ona soils. The Palm Beach soils are also much better drained than the Ona soils and lack the layer stained with humus that lies below the surface layer in the Ona soils. Palm Beach



soils are better drained than the Klej soils and are in higher positions, nearer the coast.

The natural vegetation consists of a mixed stand of pines and hardwoods, chiefly loblolly pine, cedar, and live oak. Only one soil of this series—Palm Beach fine sand, dark—occurs in this county.

**Palm Beach fine sand, dark** (0 to 2 percent slopes) (PdA).—This sandy, excessively drained soil occurs on ridges adjacent to tidal rivers or areas of Tidal marsh. The areas are on the mainland near the coast and on the coastal islands. The following describes a profile in a moist, wooded area 1.3 miles north of Shellman Bluff, immediately east of county road, under powerline.

- A<sub>11</sub> 0 to 10 inches, black (10YR 2/1) fine sand that contains many fragments of seashells; weak, fine, crumb structure; very friable; neutral; 6 to 12 inches thick; gradual, wavy boundary.
- A<sub>12</sub> 10 to 16 inches, very dark grayish-brown (10YR 3/2) fine sand that contains a few fragments of seashells; single grain; loose; neutral to mildly alkaline; 4 to 8 inches thick; abrupt, wavy boundary.
- C 16 to 144 inches, olive-brown (2.5Y 4/4) fine sand; single grain; loose; neutral.

In places broad, level areas of this soil are mottled at a depth of about 30 inches. The fragments of shells in the upper part of the profile vary in number from few to many and are conspicuous.

Included with this soil are small areas of Galestown fine sands that were too small to map separately. The Galestown soils are nearly like the Palm Beach soils. The similarity of the profiles and variations in the number of shells they contain make it difficult to distinguish between the soils of the two series.

Palm Beach fine sand, dark, is rather droughty. In some years it requires supplemental irrigation if crops are to produce maximum yields. The soil warms up early in spring and is easily cultivated. It responds fairly well to fertilization and to other management practices.

In the early 19th century, large areas of this soil were used to grow sea-island cotton. Now, most of the acreage is covered by a mixed stand of pines and hardwoods. A few areas on Harris Neck are cultivated. In these areas corn is the principal crop. (Capability unit IIIs-2; woodland group 5; range site, Coastal Hammock.)

## Plummer Series

The Plummer series consists of poorly drained soils that are extremely acid. The soils are nearly level, and some areas are slightly ponded. They have formed in sandy sediments of the Coastal Plain. The surface layer consists of dark-gray to black sand and overlies gray to light-gray sand. In areas where the soil has been cultivated, the surface layer is a lighter gray than that in uncultivated areas. In many places the underlying layers are mottled with faint to distinct splotches of gray and yellowish brown.

These soils are low to medium in content of organic matter. They are low in natural fertility.

The Plummer soils are associated with Leon, Ona, Klej, and Rutlege soils. In some places, such as on Blackbeard Island, they are associated with Blanton soils. The Plummer soils are grayer and more poorly drained than the Leon and Ona soils, and they lack the B horizon containing humus that is typical of those soils. They are

wetter and have a grayer color in the underlying layers than the Klej soils. The Plummer soils are better drained and have a thinner surface layer than the Rutlege soils. They are in lower positions and are more poorly drained than the Blanton soils.

The natural vegetation is mainly slash pine, longleaf pine, blackgum, gallberry, palmetto, and bay. Wiregrass and sawgrass grow in the open areas. Only one mapping unit of this series—Plummer sands—occurs in this county.

**Plummer sands** (0 to 2 percent slopes) (PeA).—Those poorly drained, sandy soils are extremely acid. They are on flats and in slightly ponded areas. In many places these soils lie next to areas of more poorly drained soils. In other places they are surrounded by poorly drained, clayey soils. The areas are small and are widely scattered. The following describes a profile in a wet, cutover, wooded area 3 miles northwest of Townsend on State Highway No. 99, 200 yards east of the highway.

- A<sub>1</sub> 0 to 3 inches, very dark gray (N 3/0) sand; single grain; very friable; extremely acid; 2 to 8 inches thick; abrupt, smooth boundary.
- A<sub>2</sub> 3 to 9 inches, dark-gray (N 4/0) sand; single grain; loose; extremely acid; 4 to 12 inches thick; gradual, wavy boundary.
- AC 9 to 36 inches, gray (N 5/0) sand; single grain; loose; extremely acid; 18 to 30 inches thick; gradual, wavy boundary.
- D<sub>x</sub> 36 to 48 inches +, mottled gray (N 6/0), pale-yellow (2.5Y 7/4), and brownish-yellow (10YR 6/8) sandy clay interspersed with lenses of sand; massive; the sandy clay is very firm, but the sand lenses are of loose consistence; extremely acid.

The dark-colored A<sub>1</sub> horizon is as much as 8 inches thick. It ranges in texture from sand to fine sand. The AC layer ranges in color from gray to light gray, and in texture, from fine sand to sand. In places the AC layer is faintly to distinctly mottled with yellow.

Included with these soils are areas of St. Johns fine sands, Rutlege fine sands, Weston loamy sands, thick surface, and Ona fine sands. These areas were too small to map separately.

Plummer sands are low in natural fertility. They range from low to medium in content of organic matter. A high water table generally retards infiltration. These soils have a thick root zone and good tilth. If they are to be used for cultivated crops, drainage is required. Nearly all the acreage is wooded. (Capability unit Vw-2; woodland group 8; range site, Pine-Hardwood Lowlands.)

## Portsmouth Series

The Portsmouth series consists of very poorly drained soils that are extremely acid. The soils are in drainage-ways and in areas that are covered with water during much of the year. They have formed in medium-textured materials of the lower Coastal Plain. The surface layer of black, thick loam overlies a gray subsoil of sandy clay loam.

The soils are low in natural fertility, but the surface layer is high in content of organic matter. The soils have a thick root zone, and tilth is good. The water table is high; even in dry seasons it is near the surface. Consequently, drainage is necessary before the soil can be used for truck crops or pasture.

The Portsmouth soils are associated with Weston and Lynchburg soils, and with the sandier Eulonia and Fair-

hope soils. The Portsmouth soils are more poorly drained and have a thicker, darker colored surface layer than the Weston, Lynchburg, Eulonia, and Fairhope soils. They have less clay in the subsoil than the Eulonia and Fairhope soils.

The natural vegetation is blackgum, baldcypress, water tupelo, myrtle-leaved holly, and bay. Only one soil of this series—Portsmouth loam—occurs in this county.

**Portsmouth loam** (0 to 2 percent slopes) (Por).—This very poorly drained, extremely acid soil occurs in ponded areas and in drainageways. It is in the central and western parts of the county. The following describes a profile in a wet, wooded area 1.5 miles north of the junction of State Highway No. 251, along Blue's Reach Road.

- A<sub>0</sub> ½ to 0 inch, loose, partially decomposed forest litter consisting mostly of leaves, grasses, and twigs that grades to mineral-humus soil; 0 to 1 inch thick.
- A<sub>1</sub> 0 to 17 inches, black (N 2/0) loam; matted with roots of trees and grasses; massive to weak, crumb structure; friable; extremely acid; 8 to 20 inches thick; gradual, wavy boundary.
- B<sub>2g</sub> 17 to 33 inches, dark-gray (5Y 4/1) sandy clay loam; massive; some lenses of sand; friable; extremely acid; a few root holes, filled with materials from the A horizon, extend into this layer; 12 to 24 inches thick; gradual, wavy boundary.
- D<sub>g</sub> 33 inches +, dark-gray (N 4/0) clay; a few, faint splotches of dark brown (7.5YR 4/4); massive; very plastic; extremely acid.

In some places the texture of the surface layer is fine sandy loam. The depth to clayey materials varies but is no greater than 30 inches.

Included with this soil are a few areas of Bayboro clay loams and of Rutlege fine sands. These were too small to map separately.

This soil is medium to low in natural fertility. Because water is ponded on most areas, infiltration is retarded.

All of this soil is in woods. If it were used for pasture and cultivated crops, drainage would be required. If the excess surface water were removed, the soil would be suitable for pines. (Capability unit IIIw-2; woodland group 4; range site, Bladen Flatwoods.)

## Rutlege Series

The Rutlege series consists of sandy, very poorly drained soils that are extremely acid. The soils occur in drainageways and bays and are covered with water during much of the year. They have formed in beds of unconsolidated sands. The black, very sandy surface layer overlies gray sands that in places are stained with reddish brown or dark reddish brown.

These soils are low in natural fertility, but their surface layer is high in content of organic matter. The high water table retards infiltration and permeability. The soils have a thick root zone and good tilth. Poor drainage limits their usefulness for cultivated crops.

The Rutlege soils are associated with St. Johns, Plummer, and Leon soils. They have a thicker surface layer than the St. Johns soils and lack the organic pan that is characteristic of those soils. They are more poorly drained and have a thicker, darker colored surface layer than the Plummer soils. The Rutlege soils are more poorly drained than the Leon soils and lack the organic pan that is typical of those soils. In places, areas of Rutlege soils are adjacent to uplands occupied by somewhat excessively drained Galestown soils.

The natural vegetation is chiefly blackgum, cypress, bay, and swamp holly, but there are a few pines. Only one soil of this series—Rutlege fine sand—occurs in this county.

**Rutlege fine sand** (0 to 2 percent slopes) (RkA).—This very poorly drained, extremely acid soil occurs in drainageways and in bays. Most of the acreage is north of Darien and east of U.S. Highway No. 17. Large areas are also on Sapelo Island. The following describes a profile in a wet, wooded area 50 yards south of the junction of U.S. Highway No. 17 and the School Plot Road, just east of the highway, and approximately 4 miles north of Darien.

- A<sub>1</sub> 0 to 10 inches, black (N 2/0) fine sand; weak, medium, granular structure; slightly sticky; abundant roots; high in organic matter; extremely acid; 8 to 24 inches thick; abrupt, smooth boundary.
- A<sub>2</sub> 10 to 18 inches, dark-gray (N 4/0) fine sand; single grain; nonsticky; extremely acid; 0 to 10 inches thick; abrupt, smooth boundary.
- C<sub>g</sub> 18 to 48 inches +, very dark gray (10YR 3/1) fine sand; single grain; nonsticky; extremely acid.

In places the texture of the surface layer is mucky fine sand. The color of the C<sub>g</sub> horizon ranges from very dark gray to light gray. Locally, there are stained layers in the underlying materials. The sandy materials in the profile are generally deep, but in a few places clayey materials are at a depth of only 30 to 42 inches. At that depth, some areas contain bog iron.

Included with this soil are areas of St. Johns fine sands, Plummer sands, and Portsmouth loams. These areas were too small to map separately.

Rutlege fine sand is low in natural fertility, but the surface layer is high in organic matter. Areas of this soil are generally ponded. Infiltration and permeability are retarded by the high water table.

Nearly all of the acreage is in woods, but a few areas on Sapelo Island have been drained and used for pasture. If the soil has been adequately drained, it is well suited to pines. In general, the soil is too wet to be suitable for cultivated crops. (Capability unit Vw-2; woodland group 8; range site, Pine-Hardwood Lowlands.)

## Scranton Series

The Scranton series consists of somewhat poorly drained to poorly drained, strongly acid soils. The alkaline variant differs in reaction and is somewhat poorly drained to moderately well drained. The soils have slopes ranging from 0 to 2 percent. They have formed in thick beds of alkaline loamy sands and fine sands on the Coastal Plain near the ocean. Typically, in areas that have not been cultivated, the surface layer is black fine sand. In cultivated areas the surface layer is typically dark gray. The surface layer overlies gray or dark-gray fine sand mottled with light gray.

Runoff in these soils is slow. Their internal soil drainage is medium.

The Scranton soils are associated with Galestown, Rutlege, and Ona soils. The grayish-brown or yellow transitional horizon that is immediately below the surface layer and that is typical of the Scranton soils is lacking in the Rutlege soils. The Scranton soils are much more poorly drained and have a darker surface layer than the Galestown soils. They lack the layer of weakly cemented

soil material that is immediately beneath the surface layer in the Ona soils.

The natural vegetation is longleaf pine, loblolly pine, slash pine, hickory, and sweetgum. The undergrowth is mostly gallberry and myrtle. Much of the acreage has been cleared and farmed but is now idle.

The Scranton soils are mapped only with the Ona soils. The following describes a profile of Scranton fine sand, alkaline variant, in a moist, idle area west of the air-field on Sapelo Island.

- A<sub>11</sub> 0 to 5 inches, black (5Y 2/1) fine sand that contains fragments of shells; weak, fine, granular structure; loose; neutral in reaction; 3 to 7 inches thick; gradual, wavy boundary.
- A<sub>12</sub> 5 to 8 inches, black (10YR 2/1) fine sand; weak, fine, granular structure; loose; neutral in reaction; 2 to 4 inches thick; gradual, wavy boundary.
- C<sub>1</sub> 8 to 20 inches, dark grayish-brown (10YR 4/2) fine sand faintly mottled with light gray; single grain; loose; mildly alkaline; 10 to 24 inches thick; diffuse, irregular boundary.
- C<sub>2</sub> 20 to 30 inches +, grayish-brown (2.5Y 5/2) to light brownish-gray (2.5Y 6/2) fine sand distinctly mottled with light gray (N 7/0); single grain; loose; mildly alkaline.

In cultivated areas the surface layer is very dark gray. The surface layer contains varying amounts of shells. In a few places it consists almost entirely of fragments of shells and is thicker than the surface layer in the profile described. The reaction of the soil ranges from slightly acid to mildly alkaline.

## St. Johns Series

The St. Johns series consists of poorly drained to very poorly drained soils that are extremely acid. The soils occur in areas that are ponded or extremely wet. They have formed in sands on low marine terraces. The surface layer consists of black, mucky fine sands that are matted with roots. It overlies a leached layer of gray or white sand that is several inches thick. The leached layer is underlain by a reddish-brown to black layer containing humus. This layer is friable to cemented and varies in thickness. Mottled brown or black sand, extending to a depth of several feet, underlies this layer.

The St. Johns soils are associated with Leon and Rutlege soils. They are in lower positions and are more poorly drained than the Leon soils, and they contain more organic matter in the upper part of the profile. The St. Johns soils are in positions similar to those occupied by the Rutlege soils. They have a thinner surface layer than the Rutlege soils and a layer cemented with organic matter that is lacking in the Rutlege soils.

The natural vegetation is chiefly a thick undergrowth of palmetto, hurrah brush, huckleberry, titi, and gallberry, but there are a few scattered pines. In the more poorly drained areas, blackgum, cypress, bay, and rush-grass predominate. Only one soil of this series—St. Johns fine sand—occurs in this county.

**St. Johns fine sand** (0 to 2 percent slopes) (Stj).—This very poorly drained, sandy soil occurs in ponded and extremely wet areas. Most of the acreage is on offshore islands or scattered throughout the eastern part of the county. A few areas are on the rolling sand ridge in the southwestern part of the county. The following describes a profile in a wet, thickly vegetated area 2.6 miles north and 0.4 mile east of Darien.

- A<sub>1</sub> 0 to 5 inches, black (5Y 2/1) fine sand; mucky; loose; extremely acid; contains matted roots; 4 to 12 inches thick; abrupt, wavy boundary.
- A<sub>2</sub> 5 to 10 inches, gray (5Y 5/1) fine sand; loose; fine, granular structure; extremely acid; contains some roots; 4 to 14 inches thick; abrupt, irregular boundary.
- B<sub>21</sub> 10 to 24 inches, black (10YR 2/1) fine sand; friable to weakly cemented; single grain; extremely acid; 7 to 16 inches thick; abrupt, wavy boundary.
- B<sub>3</sub> 24 to 40 inches +, very dark gray (10YR 3/1) fine sand; some streaking of colors; loose; single grain; extremely acid.

The surface layer has a texture of fine sand, but the soil material feels loamy because of its high content of organic matter. In places the A<sub>2</sub> horizon is absent. The layer cemented with organic matter ranges in color from reddish brown to black. It is hard when dry but friable when moist. The lower B horizon in places is underlain by sandy clay at a depth of 40 to 48 inches.

Included with this soil are areas of Leon fine sands and of Rutlege fine sands that were too small to map separately. In many places areas of Leon soil are adjacent to the St. Johns soil.

St. Johns fine sand is low in natural fertility and is medium to high in organic matter. Surface runoff is very slow to ponded. The movement of water in this soil is hindered by the layer cemented with organic material, which in many places traps free water in the surface layers. In most places roots have not penetrated the cemented layer but have spread out above it.

Nearly all of the acreage is wooded. The soil is too wet for pines to grow well. Drainage would increase its usefulness for growing trees. (Capability unit Vw-2; woodland group 8; range site, Pine-Hardwood Lowlands.)

## Swamp

**Swamp** (Swa).—This miscellaneous land type consists of large areas of alluvial lands that are wet during the greater part of the year. In winter and spring, the areas are generally flooded and receive fresh deposits of sediments.

Swamp also includes small islands and hammocks of sandy materials that are not above extreme high water. The materials vary in texture and in content of organic matter. The surface layer is generally dark-gray to black loam or clay loam. In the surface layer are partly rotted leaves, twigs, roots, and logs. The subsurface layer is mostly dark-gray clay.

A rather large acreage of Swamp occurs in this county. The largest single area—in Buffalo Swamp—lies next to the Altamaha River, but most of the other areas are along the South Newport River. Swamp is entirely under forest. The principal trees are cypress, swamp blackgum, sweetgum, red maple, ash, water oak, swamp chestnut oak, white oak, and yellow-poplar. In places there is a heavy undergrowth of chokeberry, alder, saw-palmetto, huckleberry, and bamboo vine. (Capability unit VIIw-1; woodland group 10; range site, Swamp.)

## Tidal Marsh

**Tidal marsh, low** (Tml).—Wide areas of this miscellaneous land type lie adjacent to the mainland. They are along the mouths of rivers and creeks that flow into the ocean. The areas are covered twice daily by tides. As a result, the surface layer is building up very slowly

by deposition. Some shifting of materials is caused by strong tidal currents. Many small creeks and rivulets cut the areas, and, in general, they connect the many rivers and sounds.

Areas of Tidal marsh along the rivers extend far back into the mainland. Some of these are along the Bellville River and extend from the ocean to the end of the river north of Eulonia. Other such areas fringe the northern part of the mainland along the South Newport River. Below Darien, in the flood plain of the Altamaha River, the marsh adjoins the delta of the river. Offshore to the east, numerous islands form a barrier against the ocean. Between these islands and the mainland are wide, shallow areas that accumulate mud and sediments from streams flowing from the mainland.

Included in this mapping unit are small areas of Tidal marsh, high. These were too small to map separately.

The soil materials of which Tidal marsh is composed vary from one area to another. The surface layer is generally a mixture of light yellowish-brown (10YR 6/4) to grayish-brown (10YR 5/2), plastic clay. It is mildly alkaline and contains large quantities of roots of grasses and rushes. The content of organic material is medium. The subsurface layer is generally gray (N 5/0), plastic clay that has many streaks of dark reddish brown (5YR 3/3). It contains many whole or partly disintegrated marsh grasses and rushes.

None of this land is cultivated. The area is covered by vegetation that tolerates salt, chiefly smooth cordgrass, marshhay cordgrass, big cordgrass, seashore saltgrass, black rush, bushy sea-oxeye, and marsh-elder. In many places small, tree-covered islands rise above the level of the marsh. (Capability unit VIIw-3; range site, Salt Marsh.)

**Tidal marsh, high (Tmh).**—The soil materials in this miscellaneous land type are firmer than those in Tidal marsh, low, and are in slightly higher positions. The surface layer is also sandier. Many areas are located between the small islands and near the mainland. Such areas are generally above the level reached by normal high tides.

Included in this mapping unit are areas of Tidal marsh, low. These areas were too small to map separately.

The principal vegetation is waxmyrtle, seashore saltgrass, smooth cordgrass, and bushy sea-oxeye. Late in winter and in spring, cattle graze many of these areas. (Capability unit VIIw-3; range site, Salt Marsh.)

## Weston Series

The Weston series consists of poorly drained soils that are strongly acid. The soils are on broad flats and in slightly ponded areas. They have formed in medium-textured materials on low marine terraces. The surface soil is very dark gray, and the subsoil is gray, mottled clay that contains lenses of sand.

These soils are low in organic matter. They are also low in natural fertility.

In poorly drained areas the Weston soils are associated with Bladen and Coxville soils. In other places they are associated with the Lynchburg and with the Eulonia and Fairhope soils, which are on the adjacent low ridges. The Weston soils have a thicker surface layer and are sandier than the Bladen and Coxville soils. They are more poorly drained than the Lynchburg, Eulonia, and

Fairhope soils. Unlike the associated soils, the Weston soils have sand lenses interspersed with the clay in the subsoil.

These soils are mainly in the central and western parts of the county. Nearly all of the acreage is in woods. Poor drainage limits the usefulness of the soils for cultivated crops, but many areas are well suited to pine trees. The natural vegetation is of two types. One type consists mainly of a thick stand of slash pine, loblolly pine, and pond pine but includes a few sweetgum and blackgum trees and myrtle brush. The second type consists of sawgrass, which is on flats where there are scattered pines and cypresses and a few bulrushes.

**Weston loamy sand, thick surface** (0 to 2 percent slopes) (Wst).—This is a poorly drained, strongly acid soil. It occurs in ponded areas. The following describes a profile in a moist, wooded area approximately 2.1 miles southeast of Townsend.

- A<sub>1</sub> 0 to 5 inches, very dark gray (10YR 3/1) loamy sand; weak, granular structure; very friable, nonsticky when wet; strongly acid; 4 to 6 inches thick; gradual, wavy boundary.
- A<sub>2</sub> 5 to 16 inches, gray to light-gray (5Y 6/1) loamy sand; a few, medium, distinct mottles of olive yellow (2.5Y 6/6); weak, fine to medium, granular structure; friable, nonsticky when wet; strongly acid; 10 to 16 inches thick; gradual, wavy boundary.
- A<sub>3</sub> 16 to 23 inches, gray to light-gray (10YR 6/1) loamy sand; common, medium, faint mottles of yellowish brown (10YR 5/6); weak, fine to medium, granular structure; nonsticky when wet; strongly acid; 4 to 8 inches thick; gradual, wavy boundary.
- B<sub>1</sub> 23 to 31 inches, gray (10YR 5/1) sandy clay; coarse, medium, faint mottles of yellowish brown (10YR 5/8) where there are sand lenses; weak, coarse, angular blocky structure; slightly sticky when wet; very strongly acid; 6 to 10 inches thick; gradual, wavy boundary.
- B<sub>2</sub> 31 to 44 inches, dark-gray (N 4/0) clay; many, fine, distinct mottles of yellowish brown (10YR 5/8) where there are sand lenses, and many, common, prominent mottles or root stains of yellowish red (5YR 4/8); weak, coarse, angular blocky structure; plastic clay, nonsticky sands; very strongly acid; 10 to 16 inches thick; gradual, wavy boundary.
- C 44 to 66 inches, dark-gray (N 4/0) sandy clay; many, coarse, prominent mottles of yellowish red (5YR 4/8) and yellowish brown (10YR 5/8), also dark-gray (5Y 4/1) sand lenses that fit into the pattern of mottles; the sand is structureless and the clays are massive; the clays are plastic and the sand lenses are nonsticky; very strongly acid.

The A horizon ranges from 18 to about 30 inches in thickness. The surface layer ranges in texture from loamy fine sand to loamy coarse sand, and the subsoil, from clay to sandy clay loam. The number of sand lenses in the subsoil varies from place to place. The lenses are generally very noticeable when the sands and clays are mixed, as in textural analysis. The material breaks apart along these sandy streaks.

Included with this soil are areas of Weston loamy fine sands, Weston very coarse sands, Plummer sands, and Lynchburg loamy fine sands. These were too small to map separately.

Weston loamy sand, thick surface, is low in natural fertility and in organic matter. It has a thick root zone and good tilth. The moisture-supplying capacity is moderate. Because of the thick layer of permeable materials, the surface drainage of this soil is better than that of Weston loamy fine sand.

This is the most extensive Weston soil mapped in the

county. Nearly all of the acreage is in woods, but a few areas are in improved pasture. If the soils are to be used for cultivated crops, they require drainage. (Capability unit IIIw-2; woodland group 8; range site, Bladen Flatwoods.)

**Weston loamy fine sand** (0 to 2 percent slopes) (Wes).—This soil is similar to Weston loamy sand, thick surface, but its A horizon is only 8 to 18 inches thick. The sand lenses in the subsoil are conspicuous, and the materials break apart along these faces. The texture, other than the lenses in the subsoil, is clay or sandy clay. The sand in the profile is generally fine.

Included with this soil are areas of Bladen-Coxville fine sandy loams; Weston loamy sand, thick surface; and Lynchburg loamy fine sands. These were too small to map separately.

Weston loamy fine sand is low in fertility and in organic matter. It has good tilth. The moisture-supplying capacity is moderate.

Nearly all of the acreage is in woods. Drainage is needed to remove excess surface water before the soil is cultivated. (Capability unit IIIw-2; woodland group 6; range site, Bladen Flatwoods.)

**Weston very coarse sand** (0 to 2 percent slopes) (Wet).—This soil contains many sharp, angular particles of quartz that are the size of pebbles. The surface layer is very dark gray and is rather coarse textured, but there is enough organic matter in it to give it a loamy feel. The layer of coarse, sandy material ranges in thickness from 6 to 30 inches. The subsoil contains sharp, angular pebbles embedded in the clayey material.

The acreage of this soil is extremely small, and the areas are small and widely scattered. The soil is not suited to cultivation. If it is to be used for pasture, it requires drainage. The materials are well suited to road construction, and borrow pits are located in many of the areas. This soil is especially desirable as a source of sand for roads because soils consisting of angular coarse sands are scarce in the county. (Capability unit Vw-2; woodland group 8; range site, Bladen Flatwoods.)

## Wet Alluvial Land

**Wet alluvial land** (0 to 2 percent slopes) (Wtl).—This miscellaneous land type is made up of very poorly drained, extremely acid soil materials. It occurs along the mouth of the Altamaha River. This land type is farther inland than the Tidal marshes, but it is still influenced by tides. It is covered with salt water when tides are pushed by high winds, and it is swept with fresh water when rivers overflow their banks. The areas are nearly level but slope slightly toward the sea.

This land type consists of sediments washed down by streams flowing out of the Coastal Plain and Piedmont areas. The soil material varies from place to place but is mostly clayey. The surface soil is typically black to grayish-brown, plastic clay. The subsoil is grayish-brown, clayey material mixed with decaying logs, stumps, and roots. In places there are thin lenses of sand. In some areas sandy material is at a depth of 3 to 8 feet. The amount of woody material varies from place to place.

Wet alluvial land is high in organic matter, but the areas that have been drained and cultivated contain less organic matter than other areas. Infiltration and permeability are retarded because of the high water table. The root

zone is thick, but tilth is poor. The soil is well supplied with magnesium and potassium, and some of the areas that were once cultivated are high in calcium and phosphorus.

Most of the acreage in this county was cleared and diked in the 19th century and was used to grow rice. The areas now support dense growths of big cordgrass, cutgrass, maidencane, and bulrush. Some of the acreage is grazed to some extent by cattle. In a few areas vegetables, particularly lettuce, and bulbs were formerly grown. Thick stands of blackgum, bay, cypress, and other trees that tolerate water cover the rest of the acreage. Wet alluvial land makes an excellent habitat for waterfowl and is used extensively by migratory wildlife. (Capability unit IVw-1; woodland group 10; range site, Fresh Marsh.)

## Formation, Classification, and Morphology of Soils

Soil is a function of parent materials, relief, climate, plant and animal life, and time. Climate and plants and animals actively alter the parent materials, through long ages, to form a soil. The nature of the soil at any point on the earth depends upon the combination of the five major factors at that point. All five of these factors come into play in the genesis of every soil, but the relative importance of each differs from place to place. In one place one factor has been more important, and, in other places, another.

Occasionally, one factor may dominate in the formation of the soil and fix most of its properties, as is common when the parent material consists of pure quartz sand. Little can happen to quartz sand, and the soils derived from it generally have faint horizons. The Lakeland soils are examples of soils formed in this kind of parent material. Even in quartz sand, however, a soil may have distinct horizons. The horizons may be distinct if the soil has formed under certain types of vegetation in an area where the topography is low and flat and there is a high water table. The Leon soils illustrate this sharply. Thus, for every soil, the past combination of the five major factors is of first importance in determining its present characteristics.

## Factors of Soil Formation

The following discusses the five factors that affect soil formation. These are parent materials, relief, climate, plant and animal life, and time.

### Parent materials

The soils of the county have developed in materials deposited by streams that flowed into brackish seas. Differences in the parent materials are largely the result of the manner in which the sands, silts, and clays were deposited.

Some materials have been in place for longer periods of time than others. Coastal dunes were formed by sands that were blown up fairly recently as abrupt ridges behind the beaches. A prominent ridge of sands that extends along the western boundary of the county has a similar origin, but the sands were deposited during an earlier time than those along the coast. Areas of Tidal

marsh and Swamp along rivers are still receiving sediments.

Many differences in the soils of the county can be attributed to the differences in the sorting and deposition of the materials. Sorting and deposition have varied from place to place. As a result, soils with very different characteristics may occur near each other. For example, very sandy soils lie next to very clayey soils in many places. In general, however, soils along the eastern part of the mainland and on the islands along the coast are rather sandy; soils in the central and western parts of the county are medium textured to fine textured.

### Relief

McIntosh County lies along the seaward edge of the Atlantic Coastal Plain. This area is called the flatwoods. In most of the county, the elevation is less than 30 feet, but in the western part there is a narrow ridge that generally has an elevation of 50 feet or more, with a few

points above 80 feet. The areas in the eastern part of the county are nearly flat; consequently, they are called flatwoods. Figure 5 shows a map of the county and indicates the location of the profile line shown in figure 6. Figure 6 shows an east-west cross section of the county and gives typical elevations at various points.

In the higher areas of the county, the water table is several feet below the surface. In most of the rest of the county, however, it is at or near the surface. This inherent wetness has a dominating influence on the soils. Soils developed in areas where the water table is high generally have a gray or black color. In contrast, well-drained soils are yellow or brown. The vegetation in the higher areas is in marked contrast to that in the lower areas, and the soils in the higher areas contain less organic matter.

Two marine terraces and shorelines (9) have been recognized between the present shoreline and the western boundary of the county (fig. 7). In figure 7, which was adapted from a map of the high terrace and Pleistocene shorelines of Georgia and Florida by F. Stearns MacNeil, the Pamlico shoreline extends roughly along the areas that have an elevation of 30 feet. The Silver Bluff shoreline, which is regarded as post-Wisconsin, lies between the areas that have an elevation of less than 10 feet and areas that have an elevation of 10 to 30 feet. The elevations as indicated are fairly accurate, but many areas are lower than shown on the map. These low areas could not be defined accurately because the map was too small.

The present coastline nearly parallels that of Pamlico times and is east of the Pamlico shoreline. The present-day ridges in the western part of the county and the bluffs of the mainland were offshore islands and bars during Pamlico times. During those times, wide salt savannas lay between the shoreline and the islands and bars.

The last significant change in the coastline took place at the end of the Pamlico period, when the essential features of the present-day shoreline were formed. Further emergence of about 8 feet took place at the end of the Silver Bluff period. This emergence only slightly modified the shoreline as it had been formed at the end of Pamlico times and broadened the features then present. This change gave rise to the offshore islands in their present-day form.

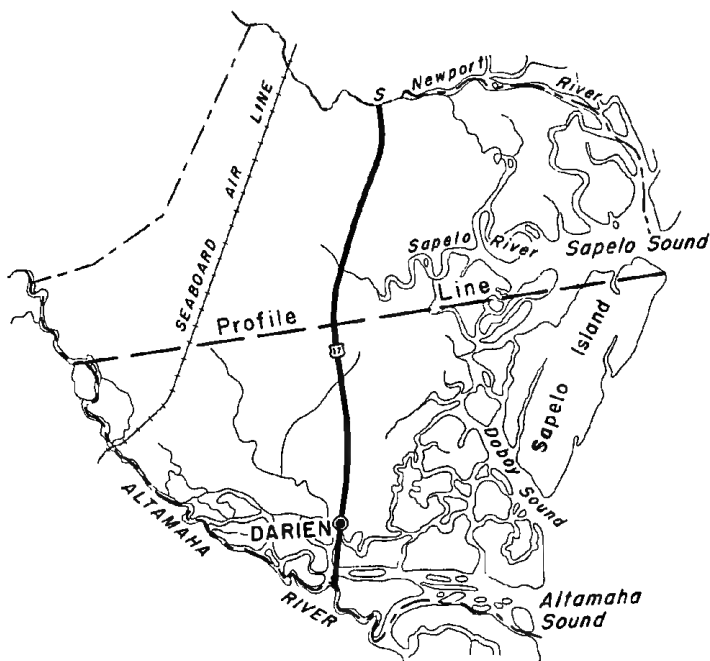


Figure 5.—Location of profile line in McIntosh County.

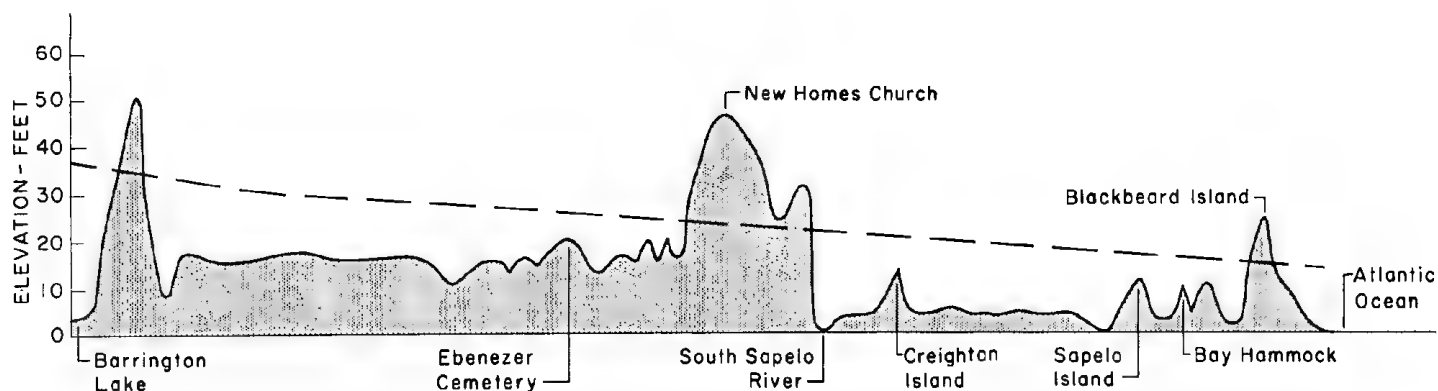


Figure 6.—East-west cross section of McIntosh County between Barrington Lake and Blackbeard Island. The solid line indicates elevation in the county. The broken line is the height to which water will rise in a tight casing of a well that penetrates the limestone aquifer (August 1957).



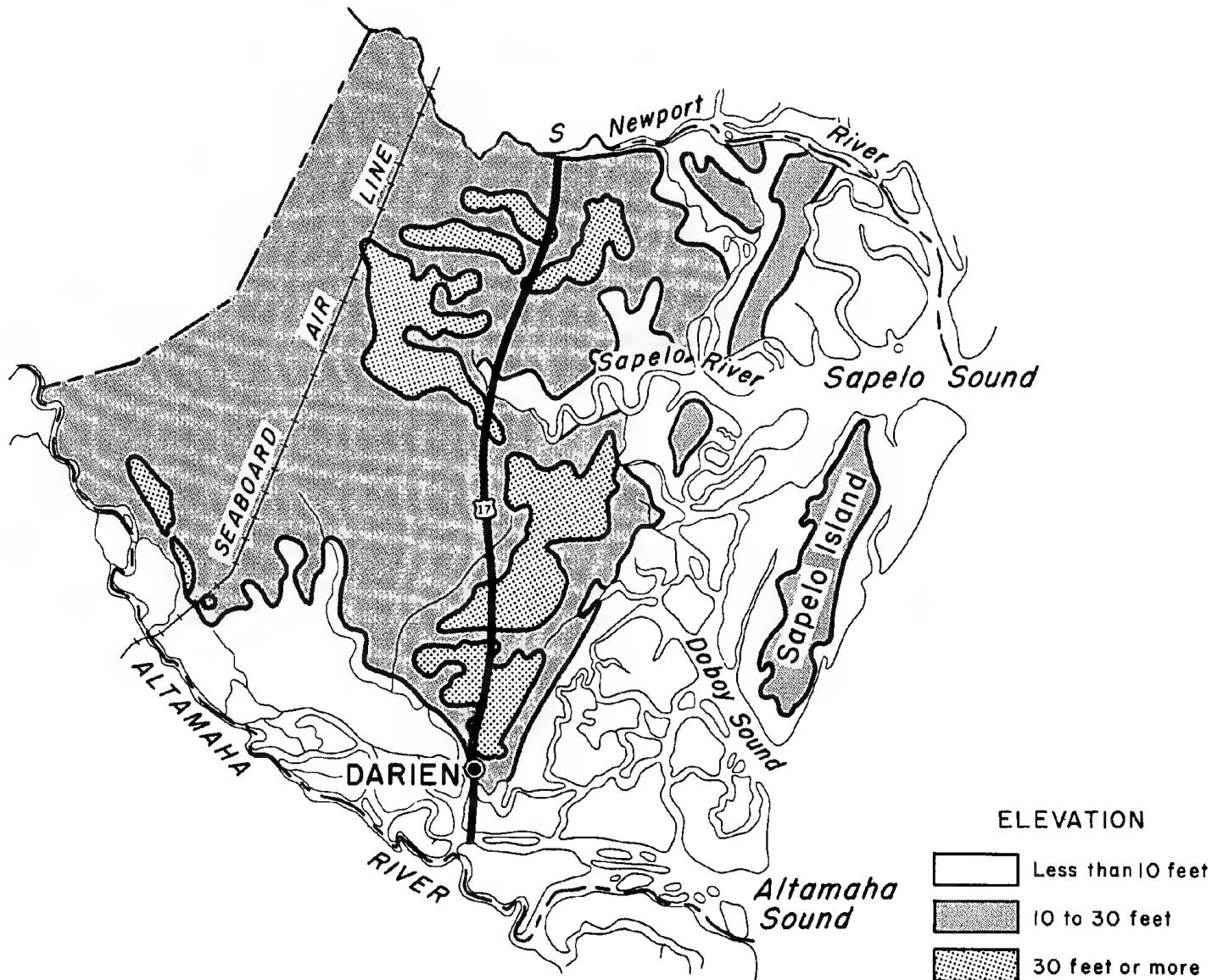


Figure 7.—Present and former shorelines in McIntosh County. The Silver Bluff shoreline lies between the areas indicated as having an elevation of less than 10 feet and areas that have an elevation of 10 to 30 feet. The Pamlico shoreline extends along the edges of areas that have an elevation of 30 feet or more. Adapted from map of the high terrace and Pleistocene shorelines of Georgia and Florida.

### Climate

The climate in McIntosh County is warm and humid. Summers are long and hot, and winters are mild. Rainfall is abundant, and most of the soils are moist or are saturated during much of the year. In this kind of climate, the decay of minerals, solution of bases, and translocation of clay are accelerated. Iron is oxidized in soils that have good internal drainage, and organic matter decays rapidly. The soils that have rapid permeability are highly leached by the water that moves through them.

### Plant and animal life

Plants and animals largely determine the kinds and amounts of organic matter that are added to the soil

and the manner in which the organic matter is incorporated into the soil. Gains and losses in organic matter, nitrogen, and plant nutrients and changes in the porosity and structure of the soil result, in many places, from the activities of plants and animals. These general effects are well known, but the specific influences of the various species, or groups of related species, on the formation of any one soil are less well known. More is known about the influence of vegetation upon the formation of soils than about the influence of organisms and larger animals.

In this county mixed forests of pines and hardwoods originally covered the uplands. Gums and cypress trees grew on the flood plains. The undergrowth was chiefly bay, maple, swamp holly, titi, and bamboovine.

Many of the trees that were important in the development of the soils had roots that penetrated deep into the soil and shed their leaves annually.

Fallen leaves transfer essential nutrients from the lower part of the soil to the uppermost part and partly replace those nutrients washed out by percolating waters. The transfer of nutrients is probably greater in drier, or better drained, soils than in those that are poorly drained. Decaying leaves, twigs, roots, and whole plants add much organic matter to the upper part of the soil, where they are acted on by micro-organisms, earthworms, and other forms of life.

Organic material decomposes faster in well-drained soils than in those that are poorly drained. As a result, poorly drained soils normally have a higher content of organic matter than well-drained soils. The effect of organic materials on the formation of soils is conditioned by climate, which, in turn, modifies the rate of chemical reaction and of leaching. Climate also is a factor in determining the kinds of plants and animals in and on the soil.

### **Time**

The alteration of soil materials so that distinct layers develop in the soil requires time. Thus, the length of time that geologic materials have remained in place is commonly reflected in the distinctness of the horizons in the soil profile.

The soils in large areas of the county are of Recent geologic age and are still accumulating new soil materials. Examples of these are Tidal marsh, Dune land, Coastal beach, and the soils on the flood plains of streams. These have been little influenced by the action of soil-forming processes and have no distinct soil horizons. The soils in such areas are of Silver Bluff age and were not above sea level until about 6,000 years ago.

The soils on the mainland are older, or of Pamlico age. They show the influence of soil-forming factors that have acted throughout a longer period. Yet, they are not weathered to the extent that they have a mature profile similar to that of soils in a forested, warm, humid climate.

### **Classification of Soils by Higher Categories**

Classification consists of an orderly grouping of defined kinds of soils into classes in a system designed to make it easier to remember soils, including their characteristics and interrelationships. Classification also helps to organize and apply the results of experience and research to areas ranging in size from plots of several acres to large bodies of millions of square miles. The defined kinds of soils are placed in narrow classes for use in detailed soil surveys and for application of knowledge within farms and fields. The many thousands of narrow classes are then grouped in progressively fewer and broader classes in successively higher categories, so that information can be applied to large geographic areas.

Classes of soils defined on a comparable basis and of the same rank in a classification system comprise what is called a category. A comprehensive system of soil classification, one that will be useful in dealing with the soils of a small field as well as with the soils of a continent, plus land areas of intermediate size, must, therefore, con-

sist of a number of categories. The higher categories consist of fewer and broader classes than the lower categories.

The system of soil classification now being used in the United States consists of six categories, one above the other. Each successively higher category consists of a smaller total number of classes, and each of those classes has a broader range of characteristics. Thus, there are thousands of classes in the lowest category and no more than three in the highest category. The intermediate categories are also intermediate in number of classes and in permissible span, or breadth, of each class. Beginning at the top, the six categories in the system of soil classification are the order, suborder, great soil group, family, series, and type.

Four of the six categories have been widely used, and two have been used very little. Of the two higher categories, the order and great soil group have been widely used. Similarly, the two lowest categories, the soil series and soil type, have been widely used. On the other hand, the categories of the suborder and family have never been fully developed and are, therefore, of little value now. In soil classification and mapping, attention has been largely given to the recognition of soil types and series within counties or comparable areas and to the subsequent grouping of the series into great soil groups and orders. The two lowest categories have been used primarily for study of soils of small geographic areas, whereas the categories of the order and great soil group have been used for the study of soils of large geographic areas.

Differences in the breadth, or span, of individual classes in each category are indicated by the total number of classes in that category. All soils in the United States are included in three classes in the highest category, that of soil orders. These same soils are placed in some 3 dozen great soil groups, a category of somewhat lower rank. Going down the ladder to the next lower category in general use, approximately 6,000 soil series have been recognized in this country. More series will be recognized as the study of soils continues, especially in areas where little work has been done in the past.

The total number of soil types is not known exactly, inasmuch as records are not maintained for individual soil types as is done for individual soil series. The total number of soil types recognized in the country as a whole, however, would be at least twice as large as the number of series. From comparisons of the respective number of orders, great soil groups, series, and types, it is immediately obvious that the ranges permitted in the properties of soils within one class in a category of high rank are broad, whereas ranges within individual classes in a category of low rank are relatively narrow.

The nature of each of the four categories—order, great soil group, series, and type—will not be described at length in this section. The soil series and the soil type are discussed in an earlier section "How a Soil Survey is Made." Readers interested in these two categories can, therefore, refer to that section. The soil order and the great soil group are described briefly in the subsequent paragraphs, as are the great soil groups in McIntosh County.

The highest category in the present system of soil classification consists of three classes, known as the zonal, intrazonal, and azonal orders. The zonal order comprises soils with evident, genetically related horizons that reflect



the dominant influence of climate and living organisms in their formation. The intrazonal order comprises soils with evident, genetically related horizons that reflect the dominant influence of one or more local factors of parent materials or topography over the effects of climate and living organisms. The azonal order comprises soils that lack distinct, genetically related horizons, commonly because of the youth of the parent materials, resistance of the parent materials to change, or steep topography. In the text of this report, these orders are often referred to as zonal soils, intrazonal soils, and azonal soils.

Because of the way in which the soil orders are defined, soils of all three generally occur in a single county, as is true in McIntosh County. Two of the orders, and sometimes all three of them, may occur in a single field.

Classification of a soil series into one of the three orders does indicate something about the factors of major importance in the formation of that soil. The classification into orders also indicates something about the degree of expression of horizons in soils, or, in other words, the degree of horizonation. Even so, the ranges in properties are wide among the soils in any one order when all of them are considered collectively. Consequently, the total number of statements that can be made for any one order, and that will be valid for all soils within that order, are limited. Primarily, the orders indicate something about important factors of soil formation and something about degree of horizonation.

The great soil group has been widely used in this country, and is the next category below the order. Classes in that category have been used to a great extent because they indicate a number of relationships in the soil genesis and also indicate something of the fertility status, adaptability for crops or trees, and the like.

Each great soil group consists of a large number of soil series that have many internal features in common. Thus, all members of a single great soil group in either the zonal or intrazonal orders have the same number and kind of definitive horizons in their profiles. These definitive horizons need not be expressed to the same degree, nor do they need to be of the same thickness in all soils within one great soil group. Specific horizons must be recognizable, however, in every soil profile of a soil series representing a given great soil group.

Great soil groups in the azonal order are defined, in part, on the nature of the profile and also, in part, on the history or origin of the soil. All members of a single great soil group have a number of internal features in common, but none of the three great soil groups in the azonal order have distinct horizonation. Consequently, all of them still bear a strong imprint of the materials from which they are being formed. Definitions of the great soil groups in the azonal order are centered on the portion of the profile approximately comparable in thickness to the solum of associated great soil groups of the zonal and intrazonal orders.

The classification of soil series in McIntosh County into great soil groups and orders is indicated in table 2. Each series recognized in the county has been classified on the basis of the current understanding of the soils and their formation. Furthermore, notes have been included in table 2 to identify series that are considered representative for a great soil group, as well as those that are placed in a given great soil group but that also bear some features common to another great soil group.

Thus, for example, the Eulonia series is considered typical for the Red-Yellow Podzolic group, whereas the Dunbar, Fairhope, and Lynchburg series are also classified in the same great soil group but show some signs of restricted or impeded drainage in the form of mottlings in the profile. Mottled patterns and gray colors are more prominent in typical Low-Humic Gley soils than they are in the Dunbar, Fairhope, and Lynchburg soils.

The device of placing series in one great soil group and then indicating that they also carry some profile features common to another great soil group permits some refinement beyond classification of soil series into a single class in the category. It, therefore, does help to give a more complete picture of the nature of the soils as they are classified in table 2.

TABLE 2.—*Classification of soil series by higher categories*

ZONAL	
Great soil group and series	Remarks
Red-Yellow Podzolic soils:	
Dunbar - - - - -	Has some profile features common to Low-Humic Gley soils.
Eulonia.	
Fairhope - - - - -	Has some profile features common to Low-Humic Gley soils.
Lynchburg - - - - -	Has some profile features common to Low-Humic Gley soils.
INTRAZONAL	
Ground-Water Podzols:	
Leon.	
Ona.	
St. Johns.	
Humic Gley soils:	
Bayboro.	
Portsmouth.	
Rutledge.	
Seranton - - - - -	Has some profile features common to Red-Yellow Podzolic soils.
Low-Humic Gley soils:	
Bladen.	
Coxville.	
Meggett.	
Plummer.	
Weston.	
AZONAL	
Regosols:	
Blanton.	
Galestown.	
Klej - - - - -	Has some profile features common to Low-Humic Gley soils.
Lakeland - - - - -	Has some profile features common to Red-Yellow Podzolic soils.
Lakewood - - - - -	Has some profile features common to Podzols.
Palm Beach.	

### Morphology of the Soils

In the following section the great soil groups represented in the county are discussed. Also described are the characteristics of the soils within each great soil group.

### Zonal soils

Zonal soils have distinct, contrasting horizons that bear evidence of the parent materials having been altered by the active factors of soil formation—climate and plant and animal life. In this county the soils of only one great soil group—the Red-Yellow Podzolic—belong to the zonal order.

#### RED-YELLOW PODZOLIC SOILS

The Red-Yellow Podzolic great soil group consists of well-developed, well-drained, acid soils. The soils have developed under forest in a warm-temperate, humid climate. They have a thin, organic ( $A_0$ ) horizon and an organic-mineral ( $A_1$ ) horizon that overlies a light-colored, bleached ( $A_2$ ) horizon. The  $A_2$  horizon, in turn, overlies a yellow or red, more clayey ( $B_2$ ) horizon. The parent materials are all more or less siliceous. Coarse, reticulate streaks or mottles of red, yellow, brown, and light gray are characteristic of the deep horizons of these soils (12).

In general, soils of the Red-Yellow Podzolic great soil group have low exchange capacity and a low base saturation. Kaolinite is the dominant clay mineral, and the subsoil has moderate to strong, subangular blocky structure. The colors are of medium to high chroma. In this county the Eulonia, Dunbar, Fairhope, and Lynchburg soils belong to the Red-Yellow Podzolic great soil group.

The Eulonia soils are the most typical of the Red-Yellow Podzolic soils in the county. They have a thin, organic-mineral ( $A_1$ ) horizon over a thin, leached, mineral ( $A_2$ ) horizon. The  $A_2$  horizon, in turn, overlies a weakly developed, clayey subsoil. Iron has moved downward in the profile to the underlying layers. The exchange capacity of the A horizon is a function of the organic content. Exchangeable calcium has accumulated in the organic matter of the  $A_1$  layer. The surface layer is high in exchangeable hydrogen. Some clay has moved downward from the A horizon, as is evidenced by clay skins in the lower layers. The A horizon is nearly structureless.

In many of these soils, the subsoil is rather thin and is faintly mottled. Variations in color result from the slightly impeded drainage in the soils. Iron and manganese are precipitated in the form of weak, irregular concretions. The structure of the subsoil is largely inherited from the parent material, which generally contains as much or more clay than the subsoil. The exchange capacity is 8 to 10 milliequivalents, which is less than that in the underlying materials, but the base saturation is higher than in the underlying materials.

The characteristics of the soils and observations made in the field indicate that the solum has formed in materials that are distinctly different from the plastic clays and sandy clays that underlie the soils.

The Dunbar, Fairhope, and Lynchburg soils belong to the Red-Yellow Podzolic great soil group, but they also have some characteristics of Low-Humic Gley soils. These characteristics are the mottling and gray color that are generally associated with wetness. The degree of expression of these characteristics has not been strong enough, however, to warrant placing these soils in the Low-Humic Gley great soil group. The soils of all three series have a thin  $A_1$  horizon, a weak  $A_2$  horizon, and a B horizon that is more clayey than the A horizon.

### Intrazonal soils

Soils of the intrazonal order have distinct, related horizons that reflect a dominating local influence, such as relief, parent materials, or time, over the effects of climate and plants and animals. Ground-Water Podzols and soils of the Humic Gley and Low-Humic Gley great soil groups are in this order.

#### GROUND-WATER PODZOLS

Ground-Water Podzols are somewhat poorly drained to poorly drained, acid soils formed under forest and heath. The soils have an organic ( $A_0$ ) or organic-mineral ( $A_1$ ) layer that overlies a light-colored, eluvial ( $A_2$ ) horizon. The  $A_2$  horizon is underlain by a dark-colored, illuvial B horizon in which the major accumulation is sesquioxides and organic matter. The accumulation may be largely organic, sesquioxides, or both. The  $A_2$  and B horizons vary considerably in thickness (12).

In general, soils of this group have a low base exchange capacity. They are also very low in exchangeable bases and high in exchangeable hydrogen. The  $A_2$  horizon is leached and gleyed, low in clay, and high in siliceous materials. The water table is seasonally high but fluctuates sharply from wet to dry periods. The B horizon is commonly cemented, but it is friable in places. It contains little clay and is very strongly acid. The Leon, St. Johns, and Ona soils are the Ground-Water Podzols in the county.

The Leon soils are the most nearly representative of the soils of this group. They have formed in siliceous materials under the influence of a high water table.

An  $A_0$  and an  $A_1$  horizon distinguish the more poorly drained St. Johns soils, but these layers are thin or absent in better drained soils of this class. A prominent  $A_1$  horizon that has an abrupt boundary to a friable B horizon that contains organic matter is common in the Ona soils. The Leon and St. Johns soils have a strongly gleyed  $A_2$  horizon. The mineral horizons are structureless, and the  $A_0$  horizon is generally peaty. The B horizon varies in thickness and is structureless to strongly cemented.

Observations in the field reveal that there are zones of organic material in many of the deep-lying sands, which indicates that these horizons may be inherited from the underlying soil materials. Leon and Ona profiles have developed in thin layers of siliceous materials that overlie more clayey material in many places within the county. Siliceous materials and a high, but fluctuating, water table appear to dominate in the development of these soils.

#### HUMIC GLEY SOILS

The Humic Gley great soil group is made up of poorly drained to very poorly drained, hydromorphic soils. The soils have a dark-colored, organic-mineral ( $A_1$ ) horizon of moderate thickness, which is underlain by mineral-gley horizons. They naturally occur under swamp-forest vegetation in a humid or subhumid climate. The Humic Gley soils are generally medium acid to mildly alkaline, but some are strongly acid (12).

The Humic Gley soils of the county are the Rutlege, Scranton, Bayboro, and Portsmouth. These soils formed under extremely wet, swampy conditions and are mostly very acid. The Rutlege soils are typical of the soils in this great soil group. The Scranton soils intergrade to Red-Yellow Podzolic soils. The A horizon has an accu-

mulation of organic matter and has a granular or crumb structure. The exchange capacity of the A horizons is greater than that in the lower horizons, and the exchange complex is saturated with exchangeable hydrogen. Base saturation is low.

The Bayboro soils have formed in fine clays; the Portsmouth soils, in medium-textured materials; and the Rutlege and Scranton soils, in structureless sands. Except in the A horizons, the structure of the soils is inherited. The Scranton soils are better drained than the Rutlege, Bayboro, and Portsmouth soils, and their reaction is generally neutral. The Scranton soils also contain more exchangeable calcium and sodium than other soils in this group.

The soils of the Humic Gley great soil group are less leached than related soils that have better drainage, but gleying is stronger. Horizons are indistinct in the profiles, except at the juncture of the organic-mineral and mineral layers. These features generally reflect the ponded conditions under which the soils formed.

#### LOW-HUMIC GLEY SOILS

Low-Humic Gley soils are somewhat poorly drained to poorly drained and have a very thin surface layer. They overlie mottled, gray and brown, gleylike mineral horizons that have a low degree of textural differentiation. They range in texture from sand to clay, and the parent materials vary widely in physical and chemical properties. Low-Humic Gley soils occur largely under swamp or under a forest made up of trees that tolerate water. The soils are generally medium to very strongly acid (12).

In this county the Bladen, Coxville, Meggett, Plummer, and Weston soils belong to the Low-Humic Gley great soil group. These soils formed where they were alternately saturated by ground water and dried out. A small amount of organic matter, generally 1.5 to 5.0 percent of the soil material in the horizon, has accumulated in the A horizon. These soils are more leached than the Humic Gley soils, which they closely resemble. The Bladen soils are more typical of the Low-Humic Gley soils than the other soils.

Minerals, such as iron, form oxides during periods when the soils are well aerated. The subsoils are faintly to prominently mottled with streaks and spots of red, yellow, or brown, but the matrix of the soil is dominantly gray. The exchange capacity is low, and in most places the base saturation is less than 30 percent. Laboratory analysis reveals that a downward movement of iron has taken place within the soil profile.

#### Azonal soils

Azonal soils commonly lack distinct, genetically related horizons because the parent materials are resistant and not easily altered, because of steep topography, or because the soil has undergone little or no weathering. The soils of only one great soil group in the county, the Regosols, are in this order.

#### REGOSOLS

Regosols are soils in which few or no clearly expressed soil characteristics have developed. They consist largely of recently deposited sands, of loess, or of glacial drift on steeply sloping lands (12). The soils of the county in this group are the Blanton, Galestown, Palm Beach, Klej, Lakewood, and Lakeland soils, which have formed in

marine sands. Such parent materials are generally inert and do not weather.

The Regosols have a distinct A horizon, which contains a significant accumulation of organic matter that accounts for nearly all the exchange capacity. Laboratory analysis reveals that little or no movement of material has taken place in the profile. If sufficient time has elapsed, most Regosols have some features common to other great soil groups and grade toward them.

The Blanton, Galestown, and Palm Beach soils are representative Regosols. The Klej soils are Regosols, but the mottling and olive-yellow to gray color in the lower part of the profile are characteristics typical of Low-Humic Gley soils. The Lakeland soils are Regosols, but the stronger color of the color B horizon, as compared with the color of the A and C horizons, indicates that they are grading toward the Red-Yellow Podzolic great soil group. The Lakewood soils are Regosols, but they have some characteristics of Podzols.

## How to Use and Manage the Soils

This section has six main parts. In the first, the system of capability classification used by the Soil Conservation Service is explained, the capability units of McIntosh County are briefly defined, and management practices are suggested for the soils of each capability unit. In the second, estimated average acre yields for each soil are given for commonly grown crops and for potential crops, and also the estimated gains in beef per acre of pasture. In the third, the use of the soils for woodland is discussed according to the properties of the soils and to the woodland suitability groups. In the fourth, range management is described, both for marsh range and for woodland range, and, in the fifth, the relation of wildlife to soils is discussed. Finally, in the sixth, certain soil qualities that affect engineering uses are set forth.

### Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable the soils are for most kinds of farming. It is a practical grouping based on the limitations of the soils, on the risk of damage when they are used, and on the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, grazing, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes, there can be as many as four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant

cover is maintained; *w* means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the country, indicates that the chief limitation is a climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it have little or no susceptibility to erosion but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping of soils for many statements about their management. Capability units are generally identified by numbers assigned locally, for example, IIc-3 or IIIw-1.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major, and generally expensive, landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible, but unlikely, major reclamation projects.

The eight classes in the capability system and the subclasses and units in this county are described in the list that follows.

**Class I.** Soils that have a few limitations that restrict their use. (None in this county.)

**Class II.** Soils that have some limitations that reduce the choice of plants or that require moderate conservation practices.

Subclass IIe. Soils moderately susceptible to erosion if they are not protected.

Unit IIe-3. Nearly level to very gently sloping, moderately well drained soils on low ridges and knolls.

Subclass IIw. Soils that have moderate limitations because of excess water.

Unit IIw-2. Nearly level, somewhat poorly drained, medium-textured soil on low ridges and knolls.

Unit IIw-3. Nearly level, somewhat poorly drained, fine-textured soil on low ridges and knolls.

**Class III.** Soils that have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Subclass IIIw. Soils that have severe limitations because of excess water.

Unit IIIw-1. Moderately well drained to somewhat poorly drained, sandy soils on broad, nearly level uplands.

Unit IIIw-2. Nearly level soils that generally have a subsoil of heavy clay and are on poorly drained, broad flats and in very poorly drained, shallow depressions.

Subclass IIIs. Soils that have severe limitations of moisture capacity or tilth.

Unit IIIs-2. Nearly level to very gently sloping, excessively drained or somewhat excessively drained, sandy soils on ridges.

**Class IV.** Soils that have very severe limitations that restrict the choice of plants, or that require very careful management, or both.

Subclass IVw. Soils that have very severe limitations for cultivation because of excess water.

Unit IVw-1. Nearly level, very poorly drained, clayey alluvial soil on the delta of the Altamaha River.

Unit IVw-3. Nearly level to very gently sloping, moderately well drained to somewhat poorly drained, sandy soils.

Subclass IVs. Soils that have very severe limitations of stones, moisture capacity, or other soil features.

Unit IVs-1. Excessively drained, sandy soil on ridges and gentle slopes.

**Class V.** Soils that have little or no susceptibility to erosion, but that have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Subclass Vw. Soils too wet for cultivation; drainage or protection not feasible.

Unit Vw-1. Nearly level, poorly drained, clayey soil.

Unit Vw-2. Nearly level, poorly drained to very poorly drained, medium-textured to coarse-textured, or sandy, soils on broad flats and in drainageways.

Unit Vw-4. Nearly level, somewhat poorly drained to poorly drained sandy soil on low ridges and knolls.

**Class VI.** Soils that have severe limitations that make them generally unsuited to cultivation and that limit their use largely to pasture or range, woodland, or wildlife food and cover. (None in this county.)

**Class VII.** Soils that have very severe limitations that make them unsuited to cultivation without major reclamation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIw. Soils very severely limited by excess water.

Unit VIIw-1. Nearly level, very poorly drained alluvial soil on the flood plains of rivers and creeks.

Unit VIIw-3. Predominantly nearly level, very poorly drained salt marshes, some of which are covered twice daily by tidal waters.

Subclass VIIs. Soils very severely limited by moisture capacity, stones, or other soil features.

Unit VIIs-1. Excessively drained, generally unproductive coarse sands on sloping ridges.

**Class VIII.** Soils and landforms having limitations that preclude their use, without major reclamation, for commercial production of plants and that restrict their use to recreation, wildlife, water supply, or esthetic purposes.

Subclass VIIIs. Rock or soil materials that have little potential for production of vegetation.

Unit VIIIs-1. Very gently sloping to sloping, sandy beaches and coastal sand dunes.

### Management by capability units

The soils in McIntosh County have been grouped in 16 capability units. The soils in a given capability unit have about the same limitations and susceptibility to damage, need about the same management, and respond to management in about the same way. In the following pages each capability unit is described, the soils in it are named, and management for the group is suggested.

#### CAPABILITY UNIT IIe-3

This capability unit consists of nearly level to very gently sloping, moderately well drained soils on low ridges and knolls. The ridges and knolls are small and scattered and are surrounded by areas of wet soils. The soils are mainly in the central and western parts of the county. They have slopes ranging from 0 to 5 percent, but in most of the acreage the slopes are less than 3 percent.

These soils have surface layers of fine sandy loam or of loamy fine sand. The A horizons are generally about 12 inches thick, but, in some of the soils, the A horizons are as much as 30 inches thick.

These soils are moderately slow in permeability, and their moisture-supplying capacity is moderate. They are strongly acid and are low in natural fertility. The soils have good tilth and a thick root zone.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
EoA	Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes	64
EpA	Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes	21
EpB	Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes	7
FpB	Fairhope fine sandy loam, 2 to 5 percent slopes	8

These soils are mainly in forest. They are well suited to pine trees and have a site index of 90 for slash pine. A few rather large areas, notably around Eulonia and along the Briardam Road south of Townsend, have been cleared and are in farms. Most of these farms are small and are operated by the owner. The principal crops are corn, oats, and vegetables, and some areas are pastured.

These soils are good for agriculture. They can be cropped intensively if they are managed properly. They are suited to corn, oats, rye, sorghum, summer vegetables, bahiagrass, bermudagrass, and lespedeza. Small grains and clean-tilled crops need to be grown alternately.

Occasionally, the cropping system should include a sod crop. The soils need fertilizer and lime. Apply the fertilizer and lime in amounts needed for specific crops, as indicated by soil tests. Work crop residues into the soil to maintain good tilth.

Suggested cropping systems are:

- Row crops (2 years); a small grain and a summer legume (1 year).
- Row crops (2 years); perennial sod (2 years or more).

#### CAPABILITY UNIT IIw-2

In this capability unit is a nearly level, somewhat poorly drained, medium-textured soil on low ridges and knolls. This soil is in the central and western parts of the county. It has slopes ranging from 0 to 2 percent.

The surface layer of this soil is loamy fine sand that

is 18 to 30 inches thick. The subsoil is friable to firm sandy clay loam that contains a few lenses of sand.

Permeability is moderate in this soil, and the moisture-supplying capacity is low to moderate. The soil is low to medium in organic matter and is low in natural fertility. It has good tilth and is very strongly acid.

The only soil in this unit is:

Map symbol	Soil	Approximate extent (percent)
LuA	Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes	100

Most of this soil is in mixed pine forest. The soil is well suited to pine trees and has a site index of 90 for slash pine. In the woodlands are many areas covered by native grasses, and these are often used as range for cattle. Some areas of this soil are in cultivated fields or in pasture. The principal crops are corn and vegetables.

This soil is suited to corn, sorghum, soybeans, oats, rye, crotalaria, lupine, and summer vegetables. It is also suited to bahiagrass, bermudagrass, whiteclover, lespedeza, millet, and similar pasture plants. To obtain high yields of crops and pasture, drainage and adequate fertilization are needed. Apply fertilizer and lime in the amounts indicated by soil tests. Work crop residues into the soil to help maintain good tilth. The soil should not be cultivated when wet. Planting is often delayed in spring because of wetness.

Some areas can be drained by bedding and by providing ditches along the boundaries of fields. Low spots can be eliminated by land leveling and shaping. Other areas are so situated that they cannot be drained without draining the surrounding wetter soils.

Suggested cropping systems are:

- Row crops (3 years); oats or rye followed by a legume (1 year).
- Row crops (3 years); sod (3 years).

#### CAPABILITY UNIT IIw-3

In this capability unit there is a nearly level, somewhat poorly drained, fine-textured soil on low ridges and knolls. This soil is in small areas in the central and western parts of the county. It is generally bounded by areas of poorly drained soils.

This soil has a surface layer of fine sandy loam. The subsoil is mottled sandy clay loam to clay.

Permeability is moderate to slow in this soil, and the moisture-supplying capacity is moderate. The soil is low in natural fertility and is medium to low in organic matter. It is strongly acid and has good tilth.

The only soil in this unit is:

Map symbol	Soil	Approximate extent (percent)
DmA	Dunbar fine sandy loam, 0 to 2 percent slopes	100

Most of this soil is in trees, to which it is well suited. The site index for slash pine is 90. In some of the wooded areas there are fair amounts of native grasses and shrubs, which are grazed by cattle. A small acreage is cultivated, and a few areas are used for pasture.

This soil is suited to corn, sorghum, oats, rye, crotalaria, and summer vegetables. It is also suited to bahiagrass, whiteclover, lespedeza, and millet for pasture.

To obtain high yields of crops, provide drainage and add fertilizer and lime in amounts indicated by soil tests.

Work crop residues into the soil to help maintain good tilth. The soil should not be cultivated when wet, and, therefore, planting is often delayed. Crops are damaged in some years by heavy rains in spring and summer.

Some areas of this soil are easy to drain. Bedding the rows and placing shallow ditches along the boundaries of fields will remove excess water. Land leveling and shaping will eliminate low spots. In some places the poorly drained soils that surround this soil need drainage to eliminate surplus water.

Suggested cropping systems are:

- Row crops (3 years); oats or rye followed by a legume (1 year).
- Row crops (3 years); sod (3 years).

#### CAPABILITY UNIT IIIw-1

This capability unit consists of moderately well drained to somewhat poorly drained, sandy soils on broad, nearly level uplands. Most of the acreage is in small areas scattered throughout the county, but there are a few rather large areas in the eastern part.

The soils have a texture of fine sand. The sandy material extends to a depth of several feet.

Permeability is moderate to high in these soils, and the moisture-supplying capacity is moderate to low. The soils are low in natural fertility and are medium to low in organic matter. They have good tilth and a thick root zone. Most areas are strongly acid, but the areas of Ona and Scranton soils on the islands are neutral to mildly alkaline.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
ObA	Ona fine sand.....	85
OsA	Ona and Scranton fine sands, alkaline variants....	15

These soils are mainly in forests of mixed pine. They are well suited to pine and have a site index of 80 for slash pine. In many places the woodland areas have been fenced. These areas now serve as native range for cattle that graze the native grasses and shrubs. A few areas are used to grow corn and vegetables, and a few areas are pastured.

If these soils are drained and adequately fertilized and limed, moderate yields of corn, forage crops, and vegetables can be obtained. The soils are used to only a limited extent for cultivated crops, but they are suited to corn, sorghum, soybeans, oats, rye, croton, indigo, lupine, bahiagrass, and vegetables.

Planting is often delayed on these soils because of wetness, and in wet years yields are reduced. If the soils are cultivated, they can be bedded and shallow ditches placed along the boundaries of fields to provide the necessary drainage. Land leveling and shaping to eliminate shallow depressions will improve some areas. Work crop residues into the soil to help maintain good tilth.

Suggested cropping systems are:

- Row crops (3 years); a small grain and a summer legume (1 year).
- Row crops continuously (in alternate seasons, plant a legume or a small grain in winter).

#### CAPABILITY UNIT IIIw-2

This capability unit consists of nearly level soils that generally have a subsoil of heavy clay. The soils are

on poorly drained, broad flats and drainageways and in very poorly drained, shallow depressions.

These soils have surface layers ranging in texture from loamy fine sand to clay loam. In some places the subsoils are medium textured, but in most places they consist of heavy, plastic clay.

Permeability is slow to retarded, and the soils are covered with water in wet seasons. The Bayboro and Portsmouth soils are medium to high in organic matter, but the other soils are low. Tilth is fair to good. Most areas of these soils are very strongly acid, but, in a few small areas, the reaction is neutral to alkaline.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
BhA	Bayboro clay loam.....	37
BkA	Bladen-Coxville fine sandy loams....	14
MBA	Meggett loam.....	1
Por	Portsmouth loam.....	1
Wst	Weston loamy sand, thick surface....	30
Wes	Weston loamy fine sand.....	17

On these soils little farming is done. Nearly all of the acreage is in trees. The Bladen, Coxville, Meggett, and Weston soils, which are poorly drained, are covered mainly by pine forests. The Bayboro and Portsmouth soils, which are very poorly drained, are covered largely with swamp hardwoods and cypress. Native grasses and shrubs growing in the woodlands produce large amounts of forage. In places the woodlands are fenced and managed as range for cattle. The acreage in native pasture is small, and a very small acreage is in improved pasture.

Crops that mature in summer or fall are the easiest to manage on these soils. The soils are suited to corn, oats, rye, rice, sorghum, vegetables, bahiagrass, dallisgrass, whiteclover, and sesbania.

Draining off the excess surface water will encourage pines to reseed and grow on most of the soils. The soils have a site index of 90 for slash pine. Slash pine would grow especially well if the areas were drained. Drainage is also necessary if cultivated crops are to be grown or the areas are to be used for pasture (fig. 8).



Figure 8.—Lowland pasture on drained areas of Weston and Bladen soils.



The soils should not be cultivated when wet, and in spring and winter tillage is often delayed by wetness. Machinery is difficult to operate during those seasons. For good yields of crops, all of these soils need a complete fertilizer, and most of them also need lime. The amounts to use are best indicated by soil tests. Choose crops that will help maintain good tilth.

Suggested cropping systems are:

- Row crops (3 years); a small grain and a summer legume (1 year).
- Row crops continuously (a legume or a small grain should be seeded each winter).

#### CAPABILITY UNIT IIIs-2

This capability unit consists of nearly level to very gently sloping, excessively drained or somewhat excessively drained, sandy soils on ridges. The soils are in the higher positions on the eastern part of the mainland and on offshore islands.

These soils have a texture of sand or fine sand. The sandy materials extend to a depth of several feet.

Permeability and the rate of infiltration are very rapid. The moisture-supplying capacity is low. The soils are generally droughty during the growing season. In most of the areas, they are strongly acid and low in fertility. The Palm Beach soil, however, is mildly alkaline and is better supplied with calcium and magnesium than the other soils in this unit. All the soils have a thick root zone and good tilth.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
GrA	Galestown fine sand, 0 to 2 percent slopes----	79
LpA	Lakeland sand, 0 to 2 percent slopes-----	12
PdA	Palm Beach fine sand, dark-----	9

During the 19th century, part of the acreage of these soils near the coast was used to grow sea-island cotton and indigo. Now, the soils are mainly in trees. The stand consists chiefly of hardwoods, but it includes scattered pines and a few cedars. Pulp and paper companies own much of the acreage and manage it for forestry. The site index for slash pine is 80, and in some areas the land has been planted to seedlings of slash pine. Some of the wooded areas that adjoin areas of Tidal marsh have been fenced and are used as marsh and upland range. In these areas shrubs and a few grasses provide a fair amount of forage for cattle. A small acreage is cultivated or is in pasture.

These soils warm up early in spring and are desirable for growing early maturing vegetables. They are fairly well suited to early varieties of corn, and to oats, rye, sweet-potatoes, melons, vegetables, crotalaria, lupine, bahia-grass, bermudagrass, and similar crops. If the soils are used for cultivated crops, they respond well to good management.

For good yields, apply fertilizer in the amounts indicated by soil tests. Alternate sod with clean-tilled crops in the cropping system, and turn crop residues under to help supply organic matter and plant nutrients.

Suggested cropping systems are:

- Grass sod or a small grain (2 to 3 years); clean-tilled crops (1 to 2 years).
- Clean-tilled crops (2 years); a small grain or crotalaria (2 years).

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#### CAPABILITY UNIT IVw-1

In this capability unit is a clayey alluvial soil, which is nearly level and very poorly drained. This soil is on the delta of the Altamaha River. It is often flooded by fresh water and, occasionally, by sea water.

Permeability is slow to retarded, and the soil is higher in organic matter and in natural fertility than most of the other soils of the county. Except for the surface layer, which, in areas near the sea is moderately alkaline, the soil is strongly acid.

The only soil in this unit is:

Map symbol	Soil	Approximate extent (percent)
Wtl	Wet alluvial land-----	100

Most of this soil was once used to grow rice. Later, selected vegetables were grown and a large dairy was established on Butler Island. Now, most of the areas are idle and are covered by cutgrass, giant cordgrass, and maidencane. In some areas cattle graze the grasses lightly.

This soil makes an excellent habitat for waterfowl if it is managed as a wildlife refuge. Areas used for agriculture need to be managed intensively. Intensive management consists of providing dikes and drainage to control the water (fig. 9), adding lime and fertilizer to improve fertility, and choosing crops that will help maintain tilth



Figure 9.—Dike and ditch for water control on an area of Wet alluvial land.

and a good supply of organic matter. If the soil is managed intensively, it is suited to rice, lettuce, beans, corn, and similar crops. The cost of intensive management is so high, however, that high-income crops must be grown to make such management worthwhile.

Suggested cropping systems are:

- Row crops (3 years); a small grain and a summer legume (1 year).
- Row crops continuously, with a legume grown each winter.

#### CAPABILITY UNIT IVw-3

This capability unit consists of nearly level to very gently sloping, moderately well drained to somewhat poorly drained, sandy soils. The soils are scattered throughout the county, but a rather large acreage is on the eastern ridges.

These soils have rapid permeability, and their moisture-supplying capacity is low. The water table is generally rather high early in spring. It drops sharply late in spring, and the soils are rather droughty during the summer. Tilth is good, and the soils have a thick root zone.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
BnB	Blanton fine sand, 0 to 5 percent slopes-----	10
KfA	Klej fine sand, 0 to 2 percent slopes-----	90

Some areas of these soils were once cultivated but are now idle. The soils, at present, are mainly in forests of pine and hardwood. They are well suited to pine; the site index for slash pine is 80. Some of the woodland areas are fenced and managed as range for cattle. The grasses and shrubs among the trees produce considerable forage. Spring vegetables do well on these soils, and there are a few gardens in thickly populated areas. The soils are fairly well suited to early maturing varieties of corn, and to sweetpotatoes, oats, rye, bahiagrass, and bermudagrass. In some years planting is delayed because of wetness.

Bedding the rows and placing shallow ditches at the ends of the fields will provide the simple drainage needed if the soils are used for cultivated crops. Plant crotalaria and similar cover crops to provide organic matter. Apply lime and fertilizer in amounts indicated by soil tests. Because of leaching, split applications of fertilizer are desirable.

Suggested cropping systems are:

- Row crops (2 years); perennial sod (4 years).
- Row crops (1 year); a small grain with crotalaria in summer (1 year).

#### CAPABILITY UNIT IVs-1

In this capability unit is an excessively drained, sandy soil on ridges and gentle slopes. This soil is mainly on Blackbeard Island, which is a wildlife preserve. A small acreage is in the eastern part of the county on the mainland. The few areas on the mainland slope toward areas of marsh or lie along streams that cut through more nearly level areas.

The surface layer of this soil is sand, which is low in organic matter. It overlies sand that extends to a depth of several feet.

Permeability is rapid. The soil is low in available moisture and is rather droughty. It is predominantly strongly acid, but spoil of oystershells influences the reaction in a few areas. The soil has a thick root zone and good tilth, but it is rather unproductive.

The only soil in this unit is:

Map symbol	Soil	Approximate extent (percent)
LpC	Lakeland sand, 5 to 8 percent slopes-----	100

All of this soil is in forest. The areas on Blackbeard Island support a dense growth of palmettoes that grow below live oaks. The areas on the mainland are mainly in low-grade hardwoods, but there are a few scattered pines.

This soil could be cleared for crops, but cultivation would be hazardous and yields generally low. The soil is marginally suited to corn, rye, crotalaria, lupine,

bahiagrass, and bermudagrass. Large amounts of fertilizer are needed for these crops.

The soil leaches readily. Work crop residues into it to help check loss of plant nutrients.

A suggested cropping system is:

Grass sod (4 to 8 years); cultivated crops (1 to 2 years).

#### CAPABILITY UNIT Vw-1

In this capability unit is a nearly level soil that is poorly drained and clayey. This soil is in the central and western parts of the county. It occupies only a small acreage.

This soil is slow to very slow in permeability. The water table is high, and water stands on the surface during wet seasons. The soil is low in organic matter and in natural fertility. Except for a few areas where alkaline material is at a depth of 3 feet or more, it is strongly acid.

The only soil in this unit is:

Map symbol	Soil	Approximate extent (percent)
BjA	Bladen loam and clay loam-----	100

Most of this soil is covered by a thin stand of pines and hardwoods and by a thick undergrowth of sawgrass, switchcane, and myrtle bushes. The few small areas that have been cleared are either idle or are in native pasture. The soil provides good range for cattle.

This soil has a site index of 90 for slash pine. If the surface water is drained off, trees reseed and make excellent growth. If drainage is not provided, the high water table keeps the trees from reseeding and checks their growth. The soil is not suited to cultivated crops. It puddles easily and should not be cultivated when wet. Pastures make good yields, however, if they are managed intensively. The management should include draining the soils and adding fertilizer and lime in amounts indicated by soil tests. If managed intensively, the soil is suited to bahiagrass, dallisgrass, and whiteclover for pasture.

#### CAPABILITY UNIT Vw-2

This capability unit consists of nearly level, poorly drained to very poorly drained, medium-textured to coarse-textured, or sandy, soils on broad flats and in drainageways. The soils are extensive in the eastern part of the county. A few areas are in the central and western parts.

The surface layers in most areas have a texture of fine sand or very coarse sand. In very poorly drained areas, however, the soils have a mucky surface layer in places. In the central and western parts of the county, the soils are commonly underlain by sandy clay in which there are lenses of sand at a depth of about 42 inches. In the eastern part, the soils are underlain by sand that extends to a depth of several feet.

Permeability and the rate of infiltration are retarded because water is near or above the surface much of the time. Surface runoff is ponded or very slow. The soils are low to moderate in moisture-supplying capacity. Some of them are high in organic matter, and others are low. They range from very strongly acid to extremely acid. Tilth is good.



The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
PeA	Plummer sands.....	12
RkA	Rutlege fine sand.....	63
Stj	St. Johns fine sand.....	24
Wet	Weston very coarse sand.....	1

A few areas of Rutlege soil, mainly on Sapelo Island, are in pasture, but most areas of these soils are wooded. Swamp hardwoods generally grow on the Rutlege soil and on some areas of St. Johns soil. In ponded areas that have not been drained, trees do not reseed well. If surface water is drained, the trees reseed and make better growth. The site index for slash pine on these soils is 90.

Areas to be used for permanent pasture must be drained intensively. Apply lime and fertilizer to these drained areas in amounts indicated by soil tests. Pasture plants to which the soils are suited are oats, rye, bahiagrass, dallisgrass, and whiteclover. The soils make good habitats for the wildlife that commonly live in wet areas.

#### CAPABILITY UNIT Vw-4

In this capability unit is a nearly level, somewhat poorly drained to poorly drained, sandy soil on low ridges and knolls. This soil is moderately deep to shallow. It occurs mostly in the eastern part of the county on the mainland. A large area lies north and east of Darien. Several small areas and a few rather large ones are scattered throughout other parts of the county.

This soil has a surface layer of fine sand. A layer cemented with organic matter is generally at a depth of 8 to 26 inches, but the depth varies from place to place. In the central and western parts of the county, the soil is underlain by clayey materials. In other areas sand is at a depth of several feet.

Permeability is restricted in the cemented layer, but it is rapid in most of the other layers. The water table is high during winter and spring, but it drops sharply in summer. The soil is generally droughty during the growing season. It is low in fertility and is extremely acid. Except in the humus layer, it is also low in organic matter. The surface layer is loose and is easily tilled.

The only soil in this unit is:

Map symbol	Soil	Approximate extent (percent)
LrA	Leon fine sand.....	100

Nearly all of this soil is in woods, but in many areas the stand is sparse. Longleaf pine is the dominant species, and pond pine is next most extensive. The ground cover consists of a dense growth of palmetto, gallberry, myrtle, runner oak, and other shrubs. During dry seasons, where there is this kind of undergrowth, forest fires are a hazard. Trees on this soil make better growth and vegetation is more prolific in areas that are underlain by clay than in those underlain by sand. Companies own a large part of the acreage. Each year, a few thousand acres is cleared and seedlings of slash pine are planted. The site index for slash pine is 70.

This soil has only a limited value for agriculture. It is poorly suited to crops, but it is marginally suited to bahiagrass for pasture. The higher areas are marginally suited to bermudagrass. Deerstongue grows among the

underbrush. Its leaves are harvested and sun-dried in summer. They are then baled at Meridian for shipment.

#### CAPABILITY UNIT VIIw-1

In this capability unit is a nearly level, very poorly drained alluvial soil that occurs on the flood plains of rivers and creeks. It is subject to frequent flooding and is covered by water for long periods of time.

The only soil in this unit is:

Map symbol	Soil	Approximate extent (percent)
Swa	Swamp.....	100

This soil was once covered by giant cypresses and other water-tolerant hardwoods, most of which have been harvested. Only the smaller and less valuable trees remain. The areas are rather low in native forage, but cattle graze some of them. Landowners also allow hogs to range throughout the areas to feed on acorns.

This soil should be managed so as to encourage the growth of the most valuable kinds of hardwoods. Cull trees need to be removed, but occasional hollow, or den, trees should be left to encourage wildlife. At present, logging is carried on periodically, primarily to harvest hardwoods. Operations are generally carried on late in summer and in fall when the areas are the least likely to be flooded.

Areas of Swamp are natural habitats for deer, squirrels, turkeys, wild hogs, ducks, and other kinds of wildlife. The numerous lakes in the Swamp abound with many different kinds of fish. Most of these areas are managed for hunting and fishing.

#### CAPABILITY UNIT VIIw-3

This capability unit consists predominantly of nearly level, very poorly drained salt marshes, some of which are covered twice daily by tidal waters. The soils are deep and vary in texture from place to place. In some places they adjoin the mainland along the mouths of rivers and creeks that flow into the ocean. Offshore to the east, many islands form a barrier against the ocean. Between these islands and the mainland are other areas of Tidal marsh. These areas are wide. Most of them are covered twice daily by ocean tides. The few areas that are not covered by normal tides are continually saturated and are covered by seasonal high tides. The salt content ranges from 5,000 to 35,000 parts per million.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
Mae	Made land.....	1
Tml	Tidal marsh, low.....	97
Tmh	Tidal marsh, high.....	2

Tidal marsh is used mainly for wildlife. Plants that tolerate salt cover the areas. The plants are chiefly smooth cordgrass, marshhay cordgrass, seashore saltgrass, big cordgrass, and myrtle. There is a good supply of forage for cattle. Areas that are accessible are grazed in winter and spring. Yields of forage of 3 to 4 tons per acre, air-dry weight, have been measured. Remoteness and poor soil stability greatly limit the usefulness of these areas for range.

Small areas of Tidal marsh have been diked and drained but have since been abandoned. If these areas ever

dry out, they become extremely acid because of the oxidation of sulfur or sulfides. Then, they are bare of vegetation.

#### CAPABILITY UNIT VIIs-1

This capability unit consists of excessively drained, generally unproductive coarse sands on sloping ridges. The soils are very deep and are in the western part of the county near the swamp along the Altamaha River. A few small areas are in the swamp.

The surface layers of these soils consist of gray coarse sands that extend to a depth of 2 to 4 inches. The subsoils are yellow coarse sands.

Permeability and the rate of infiltration are very rapid. These soils are very low in moisture-supplying capacity. They are extremely low in organic matter and in fertility and are strongly acid. Because of the strong slopes, coarse texture, and excessive drainage, the soils are very droughty.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
LwB	Lakeland coarse sand, deep, 2 to 5 percent slopes	24
LwC	Lakeland coarse sand, deep, 5 to 12 percent slopes	49
LxC	Lakewood coarse sand, thick surface, 5 to 8 percent slopes	27

These soils are not suited to field crops or pasture, and all of the acreage is in woods. Various kinds of oaks, which are of little value, are dominant in the stand. There are a few scattered longleaf pines and spruce pines, but, in general, pines are considered marginal for these soils. The site index for slash pine is 60. These areas are protected for hunting, but they are otherwise unmanaged.

#### CAPABILITY UNIT VIIIs-1

This capability unit consists of very gently sloping to sloping, sandy beaches and coastal sand dunes. The soils consist of deep, white sands and occur along the seaward sides of Sapelo and Blackbeard Islands. The beach sands that lie next to the ocean are highly saline and barren. Areas of sands that lie inland from the beach are very choppy, and the sands are constantly being shifted by wind. Sand dunes as much as 20 feet high are common. The crests of these dunes are tilted inland because of the prevailing easterly winds.

These soils are extremely droughty and are slightly alkaline. Sparse vegetation, consisting of waxmyrtle, cedar, scrub oak, and thin grasses, is slowly stabilizing the dunes toward the interior.

The soils in this unit are:

Map symbol	Soil	Approximate extent (percent)
Cub	Coastal beach	52
Dsl	Dune land	48

The beaches are not used except for recreation. Because they are not readily accessible and are privately owned, they are not used by the public. The inland sand dunes are ranged to a limited extent by cattle and deer. Sea turtles lay their eggs in the dunes. The areas are considered to have little potential, except for recreation and for wildlife.

### Estimated Yields

Table 3 gives estimated average acre yields of the principal crops now grown in the county and of crops that might be grown in the future. It also shows the value of pastures in terms of gains in pounds of beef. The estimates in table 3 are based on information obtained from local farmers, from agricultural leaders in the county, and from observations made during the survey. Estimates were obtained for some of the soils for which information was not available in the county by observing the behavior of similar soils under intensive management in other surveyed areas. Readers who wish to know more about the yields of similar soils under intensive management may obtain information by reading the soil survey reports of Duplin and Pasquotank Counties, North Carolina.

The yields, as recorded, are averages and may not be the actual yield in any given year. The estimates represent the yield to be expected under good management consisting of practices described in the discussions of the capability units. Good management also includes choosing the most suitable varieties of crops, applying fertilizer in the amounts indicated by soil tests, and controlling pests and diseases by the use of insecticides and fungicides.

### Use of Soils for Woodland

Mixed forests of slash pine, longleaf pine, and loblolly pine and of cypress, oak, hickory, and other hardwoods originally covered much of McIntosh County. The virgin stands provided materials, first, for the naval stores industry and, later, for the logging and lumbering industries. After most of the virgin stands were depleted, second-growth stands provided materials for these industries.

Large-scale cutting began about 1834 (3) and continued until approximately 1935, when the last large sawmill was closed. In 1929, the naval stores industry produced 7,000 barrels of turpentine and 35,000 barrels of rosin. At the present time, only a few operations related to the naval stores industry are carried on in the county.

Today's upland forests consist of open to thick stands of pines and hardwoods; on the lowlands are hardwoods of poor quality. Most of the forests are in large tracts. Commercial forests, of which approximately 130,000 acres is owned by pulp and paper companies, occupy about 171,600 acres in the county. Four mills where pulp and paper are processed, two pole-treating plants, and a stump-processing plant are within short distances of most points in the county.

Forest products taken from farm woodlands in the county accounted for 46.8 percent of the income derived from the sale of farm products in 1954. The products consisted mainly of pulpwood, saw and veneer logs, firewood, and fenceposts.

### Soil properties affecting tree production

Soils differ greatly in their suitability for trees. The kinds of trees that grow on a particular soil and the combinations of species, or forest types, are determined largely by the ability of the soil to maintain optimum moisture and to permit the development of an adequate root system. Other characteristics of the soil that affect

TABLE 3.—*Estimated average acre yields of principal and potential crops and gains in beef per acre of pasture*

[Absence of yield estimate indicates that soil is not suited to crop or that crop is not commonly grown on the soil specified]

Soil	Capability unit	Corn	Oats grazed	Sweet-potatoes	Rice	Let-tuce	Cab-bage	Snap beans	Coastal ber-muda-grass	Pasture (beef gains)	
										Coastal ber-muda-grass	Bahia-grass
		Bu. 60	Cow-acre-days <sup>1</sup>	Bu.	Bu. 60	Crates 150	Tons	Bu. 100	Tons	Lb.	Lb. <sup>2</sup> 350
Bayboro clay loam.....	IIIw-2	60			60						350
Bladen loam and clay loam.....	Vw-1				60						350
Bladen-Coxville fine sandy loams.....	IIIw-2	70	180				6	150	6		<sup>2</sup> 350
Blanton fine sand, 0 to 5 percent slopes.....	IVw-3	50	135	100				50	4	250	300
Coastal beach.....	VIIIIs-1										
Dunbar fine sandy loam, 0 to 2 percent slopes.....	IIw-3	90	150	150			6	150	6	400	<sup>2</sup> 500
Dune land.....	VIIIIs-1										
Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes.....	IIe-3	100	180	300			7	175	7	500	400
Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes.....	IIe-3	90	180	300			6	150	7	500	400
Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes.....	IIe-3	90	180	300			6	150	7	500	400
Fairhope fine sandy loam, 2 to 5 percent slopes.....	IIe-3	100	180	300			7	175	7	500	400
Galestown fine sand, 0 to 2 percent slopes.....	IIIs-2	50	120	100				50	6	300	300
Klej fine sand, 0 to 2 percent slopes.....	IVw-3	50	135	100				50	4	300	300
Lakeland coarse sand, deep, 2 to 5 percent slopes.....	VIIIs-1										
Lakeland coarse sand, deep, 5 to 12 percent slopes.....	VIIIs-1										
Lakeland sand, 0 to 2 percent slopes.....	IIIs-2	25	120	70					4	300	300
Lakeland sand, 5 to 8 percent slopes.....	IVs-1	20	120	50					3	250	300
Lakewood coarse sand, thick surface, 5 to 8 percent slopes.....	VIIIs-1										
Leon fine sand.....	Vw-4	20	90								250
Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes.....	IIw-2	80	180	150			6	150	6	400	<sup>2</sup> 400
Made land.....	VIIw-3										
Meggett loam.....	IIIw-2	70	180				6	150	6		<sup>2</sup> 500
Ona fine sand.....	IIIw-1	70	135					50	4		350
Ona and Scranton fine sands, alkaline variants.....	IIIw-1	70	135					50	4		350
Palm Beach fine sand, dark.....	IIIs-2	50	120	100				50	6	300	300
Plummer sands.....	Vw-2		168								300
Portsmouth loam.....	IIIw-2	70			60	150		100			350
Rutlege fine sand.....	Vw-2		168		50						350
St. Johns fine sand.....	Vw-2		168								250
Swamp.....	VIIw-1										
Tidal marsh, low.....	VIIw-3										
Tidal marsh, high.....	VIIw-3										
Weston loamy sand, thick surface.....	IIIw-2	65	168				6	100	6	300	350
Weston loamy fine sand.....	IIIw-2	65	168				6	100	6	300	350
Weston very coarse sand.....	Vw-2		168								300
Wet alluvial land.....	IVw-1	100			70	350		200			<sup>2</sup> 600

<sup>1</sup> The term cow-acre-days expresses the carrying capacity of pasture. As used here, it is the product of the number of days during the year that animals can be grazed without injury to the pasture.

<sup>2</sup> This soil is suited to whiteclover; yield stated is for mixed pasture of bahiagrass and whiteclover.

the growth of trees are the thickness of the surface layer, the texture of the soil material, the natural supply of plant nutrients, aeration, and the depth to the water table.

Drainage is an important factor that affects the suitability of a soil for trees. Depending on the relative topographic position, the amount of organic matter in the

soil, and the degree of and depth to mottling, drainage is classified as excessive, good, somewhat poor, and very poor.

Potential soil productivity is rated by determining the average site index of the different soils. The site index is determined by measuring the total height, attained at

50 years of age, of representative trees of the dominant species. For practical purposes, the site indexes are given in units of 10. Some sites are suited to hardwoods, and others, to pines. On some of the sites best suited to hardwoods, it is not advisable to grow pines. On other sites pines will give the best returns, even with the added cost of controlling competition from hardwoods. The site index ratings were determined by field studies made by representatives of the Soil Conservation Service. The ratings are tentative and are subject to revision as more information becomes available.

### Woodland suitability groups

The soils of McIntosh County have been grouped in 10 woodland suitability groups so that owners can better plan the use of their soils. These groups are listed in table 4. Each group is made up of soils that require similar conservation practices and other management and that are similar in potential productivity. Site index ratings, which indicate the potential productivity of woodlands, are given for each group, and suitable trees are listed by species priority. The site index is the total height obtained by the dominant trees at 50 years of age.

The expected hazard from competition by other plants is rated in table 4 as *slight*, *moderate*, or *severe*. A rating of slight means that competition from other plants is no

special problem; of moderate, that plant competition develops but generally does not prevent an adequate stand from becoming established; and of severe, that plant competition prevents trees from restocking naturally.

Ratings for equipment limitations—the soil characteristics that restrict or prohibit the use of equipment commonly used in tending and harvesting the trees—are also given according to the terms *slight*, *moderate*, and *severe*. By slight is meant no restriction in the kind of equipment or in the time of year it is used; by moderate is meant a seasonal restriction of less than 3 months in using the equipment; and by severe is meant a seasonal restriction of more than 3 months in the use of equipment.

Seedling mortality refers to the expected degree of mortality of seedlings as influenced by kinds of soil. The ratings are: *Slight*—ordinarily, adequate natural regeneration will take place; *moderate*—natural regeneration cannot always be relied upon for adequate and immediate restocking; *severe*—much replanting, special seedbed preparation, and superior planting techniques are needed to assure adequate restocking.

Windthrow hazard is an evaluation of soil characteristics that control the development of tree roots affecting wind-firmness. The ratings are: *Slight*—no special problem is recognized; *moderate*—root development of designated species is adequate for stability except for periods of

TABLE 4.—Woodland suitability

Woodland group	Site index <sup>1</sup>			Species priority
	Slash pine	Loblolly pine	Longleaf pine	
Group 1: Moderately well drained soils that have a moderately fine textured subsoil through which water infiltrates fairly slowly.	90-----	90-----	70-----	Loblolly pine, slash pine, and longleaf pine.
Group 2: Somewhat poorly drained soils that have a medium-textured to moderately fine textured subsoil and a fine-textured substratum.	90-----	90-----	80-----	Loblolly pine, slash pine, and longleaf pine.
Group 3: Moderately well drained to somewhat poorly drained, sandy soils.	80-----	80-----	70-----	Loblolly pine, slash pine, and longleaf pine.
Group 4: Poorly drained to very poorly drained soils that have a medium-textured to fine-textured subsoil; ponded in places.	90-----	100-----	-----	Loblolly pine and slash pine----
Group 5: Excessively drained and somewhat excessively drained, sandy soils through which water moves rapidly.	80-----	80-----	70-----	Slash pine, loblolly pine, and longleaf pine.
Group 6: Poorly drained soils that have a fine-textured subsoil and slow permeability.	90-----	90-----	70-----	Loblolly pine and slash pine----
Group 7: Somewhat poorly drained to poorly drained soil that has a layer cemented with organic matter.	70-----	-----	60-----	Slash pine, loblolly pine, and longleaf pine.
Group 8: Poorly drained to very poorly drained, coarse-textured soils that have a high water table.	90-----	90-----	70-----	Sweetgum, tupelo-gum, loblolly pine, slash pine, and pond pine.
Group 9: Excessively drained, deep sands that have very rapid permeability.	60-----	60-----	50-----	Slash pine, longleaf pine, and loblolly pine.
Group 10: Very poorly drained soils that are flooded frequently.	Varied-----	Varied-----	Varied-----	Various species of hardwoods----

<sup>1</sup> In this county miscellaneous land types not suited to trees are Coastal beach; Dune land; Made land; Tidal marsh, low; and Tidal marsh, high.

excessive wetness and during periods of greatest wind velocity; *severe*—depth of tree rooting does not give adequate stability.

Erosion hazard refers to the potential erosion hazard when the soil is managed according to currently acceptable standards. The ratings are based on the increasing risk of erosion.

Information about site indexes provides a basis for relating published research on timber volume production by species, age, and site index classes to the different kinds of soils shown on the soil map. Table 5, based on published research (13), shows how site index ratings can be converted readily into cords or into cubic or board foot measure.

#### WOODLAND GROUP 1

This group (see table 4) consists of moderately well drained soils on low ridges and on small, scattered knolls. The soils have a moderately fine textured subsoil through which water infiltrates fairly slowly. They are low in natural fertility and in content of organic matter. The following soils are in this group:

- Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes.
- Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes.
- Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes.
- Fairhope fine sandy loam, 2 to 5 percent slopes.

#### grouping of soils <sup>1</sup>

The site index is 90 for slash pine and for loblolly pine growing on these soils. It is 70 for longleaf pine. The site index for slash pine was not based on actual measurements made in this county but was based on measurements of trees growing on similar soils in the lower coastal plains of Georgia. Based on yield tables of well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 25,900 board feet of slash pine (Scribner rule) when the trees are 50 years of age, or of 28,250 board feet of loblolly pine or 11,400 board feet of longleaf pine.

Competition from other plants is moderate to severe. In places moderate competition from other plants delays natural regeneration and slows the initial growth of trees. It does not, however, prevent an adequate stand of desirable species from becoming established. Light preparation of the seedbed will help to obtain adequate restocking. In areas where competition from other plants is severe, natural regeneration cannot be relied upon to provide adequate restocking of designated species without special preparation of the site, such as prescribed burning, applying chemical sprays, clearing and disking, or other treatment.

Limitations in the use of equipment are generally moderate. Usually, equipment can be used 9 months of

Interpretations for woodland conservation					Remarks
Plant competition	Equipment limitation	Seedling mortality	Windthrow hazard	Erosion hazard	
Moderate.....	Moderate.....	Slight.....	Slight.....	Slight.....	Site index for longleaf pine growing on Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes, is higher in places than the average indicated for this group.
Moderate.....	Moderate.....	Slight.....	Slight.....	Slight.....	Site index is 80 for longleaf pine growing on Dunbar fine sandy loam, 0 to 2 percent slopes.
Moderate to severe	Moderate.....	Slight.....	Slight.....	Slight.....	Site index is 65 for longleaf pine growing on Blanton fine sand, 0 to 5 percent slopes.
Severe.....	Severe.....	Slight.....	Slight.....	Slight.....	Site index is 100 for slash pine growing on Bayboro clay loam in areas where excess surface water is controlled.
Severe.....	Slight.....	Severe.....	Slight.....	Slight.....	Site index is 90 for loblolly pine on Galestown fine sand, 0 to 2 percent slopes.
Moderate.....	Severe.....	Slight.....	Slight.....	Slight.....	In areas where layers cemented with organic matter are at a depth of 18 inches or below, longleaf pine has a site index of 70. Water may need to be controlled if some species are to be established. The site index is 100 for loblolly pine on Weston very coarse sand. Small sawlog-size or pulpwood-size rotations may be feasible.
Moderate.....	Moderate.....	Moderate.....	Moderate.....	Slight.....	
Severe.....	Severe.....	Severe.....	Severe.....	Severe.....	
Severe.....	Moderate.....	Severe.....	Slight.....	Slight.....	
Varied.....	Varied.....	Varied.....	Varied.....	Varied.....	

<sup>2</sup> Site index is the average height of the dominant trees at 50 years of age. It indicates potential productivity.

TABLE 5.—Average stand and yield information per acre for well-stocked, unmanaged, naturally occurring stands of loblolly pine, slash pine, and longleaf pine

[Statistics in this table are compiled from United States Department of Agriculture Miscellaneous Publication No. 50 (13)]

## LOBLOLLY PINE

Site index	Age	Total merchantable volume per acre			Average height of dominant trees	Average diameter at breast height	Basal area at breast height	Total trees per acre
	Years	Cu. ft.	Cords	Bd. ft. (Scribner)	Feet	Inches	Sq. ft.	Number
60-----	20	1,500	12		32	3.6	121	1,600
	30	2,750	25	1,250	45	5.4	138	850
	40	3,700	35	4,500	54	6.8	147	585
	50	4,300	41	8,550	60	7.9	152	440
	60	4,700	46	12,250	64	8.9	156	860
70-----	20	1,900	17	100	38	4.3	125	1,185
	30	3,350	31	3,500	52	6.5	143	640
	40	3,500	42	9,400	63	8.1	151	435
	50	5,200	50	15,200	70	9.4	157	325
	60	5,700	55	19,600	75	10.6	160	270
80-----	20	2,350	22	700	43	5.0	129	950
	30	4,000	38	6,500	59	7.4	147	510
	40	5,300	51	14,800	72	9.2	156	345
	50	6,150	60	21,700	80	10.7	162	255
	60	6,650	66	26,400	85	12.0	165	210
90-----	20	2,850	27	1,000	48	5.6	133	790
	30	4,700	46	10,700	67	8.2	152	420
	40	6,200	61	20,550	81	10.2	162	290
	50	7,200	71	28,250	90	12.0	167	220
	60	7,800	78	33,100	96	13.4	171	180
100-----	20	3,300	32	2,750	54	6.1	138	690
	30	5,400	53	14,800	74	9.0	158	375
	40	7,150	71	26,700	90	11.2	168	255
	50	8,400	84	35,050	100	13.1	174	190
	60	9,150	92	41,000	107	14.6	178	155

## SLASH PINE

Site index	Age	Cu. ft.	Cords	Bd. ft. (Scribner)	Feet	Inches	Sq. ft.	Number
60-----	20	1,850	20		36	3.5	143	2,035
	30	3,150	32	1,050	48	5.0	152	1,140
	40	4,050	40	4,100	55	6.3	155	710
	50	4,750	45	7,500	60	7.2	157	550
	60	4,900	48	10,500	64	7.9	158	470
70-----	20	2,750	28		42	4.2	146	1,445
	30	4,000	40	3,500	56	6.0	156	820
	40	4,800	49	9,300	64	7.5	159	500
	50	5,800	55	14,250	70	8.6	161	390
	60	6,050	59	17,400	74	9.4	162	335
80-----	20	3,400	35	40	48	4.9	148	1,090
	30	4,800	48	7,300	63	7.0	158	610
	40	5,850	58	15,150	73	8.7	161	380
	50	6,900	65	20,235	80	10.0	163	295
	60	7,150	69	23,600	85	10.8	164	250
90-----	20	4,050	41	2,750	54	5.6	149	835
	30	5,550	54	12,300	71	8.0	159	470
	40	6,650	66	20,600	83	10.0	163	295
	50	7,850	73	25,900	90	11.4	165	220
	60	8,100	78	29,600	95	12.5	166	195
100-----	20	4,600	46	5,050	61	6.4	150	625
	30	6,100	59	16,850	79	9.1	160	365
	40	7,300	72	25,450	92	11.4	164	225
	50	8,700	81	31,250	100	13.1	166	175
	60	8,950	86	35,400	106	14.2	167	150



TABLE 5.—Average stand and yield information per acre for well-stocked, unmanaged, naturally occurring stands of loblolly pine, slash pine, and longleaf pine—Continued

[Statistics in this table are compiled from United States Department of Agriculture Miscellaneous Publication No. 50 (13)]

## LONGLEAF PINE

Site index	Age	Total merchantable volume per acre			Average height of dominant trees	Average diameter at breast height	Basal area at breast height	Total trees per acre
	Years	Cu. ft.	Cords	Bd. ft. (Scribner)	Feet	Inches	Sq. ft.	Number
50	20	500	4		26	2.8	64	1,410
	30	1,150	11	200	37	4.1	78	900
	40	1,700	17	900	45	5.1	88	625
	50	2,150	21	2,100	50	5.9	95	505
	60	2,550	25	3,700	55	6.6	100	430
	70	2,850	28	5,400	58	7.2	104	375
	80	3,150	31	7,250	61	7.8	106	335
60	20	1,000	8	50	31	3.3	79	1,290
	30	1,900	19	900	44	4.9	97	815
	40	2,750	27	2,800	53	6.0	108	575
	50	3,450	34	5,900	60	7.0	118	465
	60	4,000	40	9,300	65	7.8	124	395
	70	4,500	45	12,350	70	8.5	128	345
	80	4,900	49	15,000	73	9.1	131	305
70	20	1,500	14	200	36	3.8	92	1,150
	30	2,700	28	2,000	52	5.5	113	730
	40	3,800	39	6,100	62	6.8	127	515
	50	4,700	48	11,400	70	7.9	138	415
	60	5,600	55	16,400	77	8.8	145	353
	70	6,200	62	20,400	82	9.6	150	305
	80	6,800	67	23,700	86	10.3	153	270
80	20	2,050	20	550	41	4.3	102	1,050
	30	3,500	36	3,800	59	6.1	124	655
	40	4,900	49	10,800	71	7.3	140	465
	50	6,000	61	17,600	80	8.8	152	375
	60	7,000	70	23,500	87	9.8	160	315
	70	7,800	78	28,300	93	10.6	166	270
	80	8,550	85	32,100	98	11.5	169	240

the year without difficulty. Roads will need adequate drainage. Controlled drainage is sometimes practical.

Generally, seedling mortality is slight on these soils. Less than 25 percent of the planted stock is lost. Satisfactory restocking from initial plantings or natural regeneration can be expected.

Windthrow is not a serious hazard on these soils. Individual trees are expected to remain standing when released on all sides. Therefore, cutting can be done without danger of future losses by windthrow, except from abnormally high winds. The hazard of erosion is slight.

## WOODLAND GROUP 2

This group (see table 4) consists of somewhat poorly drained soils that have a medium-textured to moderately fine textured subsoil and a fine textured substratum. The following soils are in this group:

Dunbar fine sandy loam, 0 to 2 percent slopes.

Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes.

The site index is 90 for slash pine and loblolly pine on these soils. It is 80 for longleaf pine. Based on yield tables of well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 25,900 board feet per acre (Scribner rule) of slash pine when the trees

are 50 years of age, 28,250 board feet of loblolly pine, and 17,600 board feet of longleaf pine.

Competition from other plants is moderate on these soils. It does not prevent desirable species from becoming established, but it delays the natural regeneration of trees and slows the initial growth. Light preparation of the seedbed will help to obtain an adequate stand; special preparation of the seedbed is not needed.

Limitations in the use of equipment are moderate. Equipment can be used 9 months of the year without difficulty. Roads will need adequate drainage.

These soils have no special problems of seedling mortality. Satisfactory restocking usually can be expected from initial plantings. If adequate sources of seed are available, a satisfactory stand of trees is obtained through natural regeneration.

The hazard of windthrow is not serious. Individual trees can be expected to remain standing when released on all sides. Cutting can be done without danger of future losses by windthrow, except from abnormally high winds. The hazard of erosion is slight.

## WOODLAND GROUP 3

This group (see table 4) consists of moderately well drained to somewhat poorly drained, sandy soils. The soils are low in natural fertility. They are medium to

low in content of organic matter. The following soils are in this group:

Blanton fine sand, 0 to 5 percent slopes.  
Klej fine sand, 0 to 2 percent slopes.  
Ona fine sand.  
Ona and Seranton fine sands, alkaline variants.

The site index is 80 for slash pine and loblolly pine growing on these soils and is 70 for longleaf pine. Based on yield tables for well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 20,235 board feet of slash pine when the trees are 50 years of age, 21,700 board feet of loblolly pine, and 11,400 board feet of longleaf pine (fig. 10).

Competition from other plants is moderate. It does not prevent desirable species from becoming established on these soils, but it delays the natural regeneration of trees and slows their initial growth. Special preparation of the seedbed is not necessary, except in areas where heavy stands of wiregrass would restrict satisfactory restocking of longleaf pine. In these areas prescribed burning or light disking is desirable. In other areas light preparation of the seedbed will help to obtain a satisfactory stand.

Limitations in the use of equipment are slight. Equipment can be used at any time during the year, except immediately after heavy rains.

Seedling mortality is not a problem on these soils. Satisfactory restocking of trees generally is obtained from the first planting and few seedlings are lost. If adequate sources of seed are available, a satisfactory stand of trees is obtained through natural regeneration.

The hazard of windthrow is slight. Individual trees can be expected to remain standing when released on all sides. Cutting can be done without danger of future losses by windthrow, except from abnormally high winds. The hazard of erosion is slight.

#### WOODLAND GROUP 4

This group (see table 4) consists of poorly drained to very poorly drained soils. The soils have a medium-textured to fine-textured subsoil and are ponded in places. The following soils are in this group:

Bayboro clay loam.  
Bladen loam and clay loam.  
Meggett loam.  
Portsmouth loam.



Figure 10.—Road built by a paper company to provide access, fire protection, and better drainage for the trees.

The site index is 90 for slash pine growing on these soils and 100 for loblolly pine. Based on yield tables for well-stocked, unmanaged stands, the site indexes indicate a potential yield per acre of 25,900 board feet of slash pine when the trees are 50 years of age, or 35,050 board feet of loblolly pine.

Competition from other plants is severe on these soils. Natural regeneration cannot be relied upon to provide adequate restocking, unless the site is given special preparation. Prescribed burning, using chemical sprays, girdling, clearing and diskings, and other management practices are needed to prepare the sites so that seedlings can become established.

Limitations in the use of equipment are severe because water stands on or near the surface during most of the year. Controlled drainage is necessary in some areas. The position of these soils makes them difficult to drain. Outlets are not readily available, and the costs of construction are high. Because the soils are wet, they are difficult to manage.

Seedling mortality is severe on these soils. Loss of seedlings is generally greater than 50 percent of the planted stock. Natural regeneration cannot be relied upon to restock the areas. If rainfall is normal, these soils require controlled drainage for adequate stocking of some species. The hazard of windthrow is slight. Individual trees can be expected to remain standing when released on all sides. Cutting, therefore, can be done without danger of future losses resulting from windthrow other than that caused by abnormally high winds. The hazard of erosion is slight.

#### WOODLAND GROUP 5

This group (see table 4) consists of excessively drained and somewhat excessively drained, level to gently sloping sands through which water moves rapidly. The soils have thick, very porous root zones. They are low in natural fertility and in content of organic matter. Permeability is rapid, and the water-holding capacity is low. Plant nutrients are easily leached from these soils. The following soils are in this group:

- Galestown fine sand, 0 to 2 percent slopes.
- Lakeland sand, 0 to 2 percent slopes.
- Lakeland sand, 5 to 8 percent slopes.
- Palm Beach fine sand, dark.

The site index is 80 for slash pine and loblolly pine growing on these soils. It is 70 for longleaf pine. The site index for slash pine was not based on actual measurements made in this county but was based on measurements of trees growing on similar soils in the lower coastal plains of Georgia. Based on yield tables of well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 20,235 board feet of slash pine when the trees are 50 years of age, 21,700 board feet of loblolly pine, or 11,400 board feet of longleaf pine.

Competition from other plants prevents the natural regeneration of desirable kinds of trees on these soils. Prescribed burning, use of chemical sprays, girdling, clearing, and planting and replanting are needed.

These soils have only a slight limitation in the use of equipment. Equipment can be used throughout a large part of the year.

Loss of seedlings is generally more than 50 percent of the planted stock. Special preparation of the seedbed and superior planting techniques are required. Also, much replanting is necessary.

The hazard of windthrow is slight. Individual trees exposed to normal winds can be expected to remain standing if released on all sides.

The hazard of erosion is slight on the nearly level soils and moderate on the gently sloping ones. Following the contour when plowing firebreaks and furrows reduces the damage from erosion.

Loblolly pines growing on these soils may be damaged severely by tipmoths because the trees are not vigorous.

#### WOODLAND GROUP 6

This group (see table 4) consists of poorly drained soils that have a fine-textured subsoil. Permeability is slow or retarded. The following soils are in this group:

- Bladen-Coxville fine sandy loams.
- Weston loamy fine sand.

The site index is 90 for slash pine and loblolly pine growing on these soils. It is 70 for longleaf pine. Based on yield tables for well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 25,900 board feet of slash pine when the trees are 50 years of age, 28,250 board feet of loblolly pine, or 11,400 board feet of longleaf pine.

Competition from other plants is moderate. It does not prevent desirable species from becoming established on these soils, but it delays the natural regeneration of trees and slows the initial growth. Special preparation of the seedbed is not needed, but light preparation will help to obtain a satisfactory stand.

Limitations on the use of equipment are moderate. Some areas are ponded during wet periods. Roads will require adequate drainage.

These soils have no special problems of seedling mortality. Satisfactory restocking usually can be expected from initial plantings. If adequate sources of seed are available, a satisfactory stand of trees is obtained through natural regeneration.

The hazard of windthrow is not serious. Individual trees can be expected to remain standing when released on all sides. Therefore, cutting can be done without danger of future losses other than those resulting from abnormally high winds. The hazard of erosion is slight.

#### WOODLAND GROUP 7

Only one soil—Leon fine sand—(see table 4) is in this woodland group. This moderately deep to shallow soil contains a layer that is cemented with organic matter. It is somewhat poorly drained to poorly drained. During periods when rainfall is heavy, this soil is rather wet, but it is droughty during dry seasons. It is low in natural fertility.

The site index is 70 for slash pine on this soil and 60 for longleaf pine. Based on yield tables for well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 14,250 board feet of slash pine when the trees are 50 years of age, or 9,300 board feet of longleaf pine.

Competition from other plants is moderate to severe. In naturally occurring stands, competition can be expected from wiregrass and from sawtooth palmetto. Natural regeneration cannot be relied upon to provide adequate restocking of longleaf pine. Prescribed burning, disking, planting, and other special management practices will be required to establish desired species, generally

slash pine. Careful preparation of the seedbed will also be necessary.

Limitations on the use of equipment are moderate. Controlling excess surface water may help to make work easier in the woodlands.

Loss of seedlings is ordinarily between 25 and 50 percent. Replacing longleaf pine with slash pine may facilitate natural regeneration.

The hazard of windthrow is no special problem. Individual trees can be expected to remain standing when released on all sides. Therefore, cutting may be done without danger of further losses other than those resulting from abnormally high winds. The hazard of erosion is slight.

#### WOODLAND GROUP 8

This group (see table 4) consists of poorly drained to very poorly drained soils. The soils are coarse textured and have a high water table. They are low in fertility. The following soils are in this group:

- Plummer sands.
- Rutlege fine sand.
- St. Johns fine sand.
- Weston loamy sand, thick surface.
- Weston very coarse sand.

The site index is 90 for slash pine and loblolly pine growing on these soils and 70 for longleaf pine. Based on yield tables for well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 25,900 board feet of slash pine when the trees are 50 years of age, 28,250 board feet of loblolly pine, or 11,400 board feet of longleaf pine.

Competition from other plants is severe on these soils. It prevents natural regeneration from providing adequate stocking of desirable trees. Prescribed burning, using chemical sprays, girdling, clearing and disking, controlling water, and other special management practices are needed to prepare the sites for planting (fig. 11).

Limitations in the use of equipment are severe because of the high water table. Because of their position, the soils are difficult to drain, particularly in areas where the natural outlets are located at remote distances.

These soils are generally excessively wet during the period when seeds would normally germinate. Therefore, seedling mortality is severe. The restocking of pine requires that drainage be controlled.

Windthrow is not a serious hazard. Individual trees can be expected to remain standing when released on all sides. Therefore, cutting can be done without danger of future losses other than those resulting from abnormally high winds.

#### WOODLAND GROUP 9

This group (see table 4) consists of excessively drained, deep sands. Permeability is very rapid. The soils are low in natural fertility and in content of organic matter. Because of the low water-supplying capacity of these soils, the growth of trees is restricted. The following soils are in this group:

- Lakeland coarse sand, deep, 2 to 5 percent slopes.
- Lakeland coarse sand, deep, 5 to 12 percent slopes.
- Lakewood coarse sand, thick surface, 5 to 8 percent slopes.

The site index is 60 for slash pine and loblolly pine growing on these soils. It is 50 for longleaf pine. The site indexes were not based on actual measurements made in this county but were based on measurements



Figure 11.—Pines and palmettoes growing at the edge of a wooded area. On the right is an area of Rutlege fine sand that has recently been drained; on the left is an area of Blanton fine sand (woodland group 3) that is undrained.

made of trees growing on similar soils in the lower coastal plains of South Carolina. Based on yield tables of well-stocked, unmanaged stands, the site indexes indicate a total potential yield per acre of 7,500 board feet of slash pine when the trees are 50 years of age, 8,550 board feet of loblolly pine, or 2,100 board feet of longleaf pine.

Because these soils are low in water-supplying capacity, competition from other plants is severe. The low water-supplying capacity prevents the natural regeneration of desirable kinds of trees. Prescribed burning, use of chemicals, girdling, clearing, disking, and planting and replanting are needed.

Limitation on the use of equipment is slight. Equipment can be used throughout the entire year.

Because the soil is droughty and low in fertility, loss of seedlings is generally more than 50 percent of the planted stock. Natural regeneration cannot be relied upon to restock the areas. Superior planting techniques are required, and much replanting is necessary.

The hazard of windthrow is slight. Individual trees can be expected to remain standing when released on all sides. Cutting can be done without danger of future losses other than those resulting from abnormally high winds. The hazard of erosion is slight.

#### WOODLAND GROUP 10

This group (see table 4) consists of very poorly drained soils that are flooded frequently and are permanently waterlogged. The characteristics, limitations, and potentials of these soils vary so widely that they are described only generally. However, the present interest in

managing soils to improve yields of wood products indicates that many of these overly wet sites will be improved by installing structures to control water. The following soils are in this group:

Swamp.  
Wet alluvial land.

The potential yields on these soils range from low to high. The competition from other plants is severe. Because the soils are wet, equipment is difficult to use and cannot be used during part of the year.

Seedling mortality is severe. Special preparation of the seedbed is necessary, and superior planting techniques are needed to assure adequate restocking. Much replanting is necessary.

The hazards of windthrow and of erosion are slight.

## Range Management

More than one-third of the acreage in McIntosh County is used for range. Of this, approximately 13 percent consists of marshes and 21 percent, of woodlands. A small acreage is in tame pasture. Both marsh range and woodland range have seasonal value. If they are used in proper combination or with tame pastures, areas of native range provide a cheap source of forage.

The 36,618 acres of marsh used as range is along the coast. It provides forage for cattle and hogs. The areas are generally wet and are not suitable for cultivated crops. Use as a habitat for wildlife is the only other significant utilization.

The 60,480 acres of woodland used for range also provides forage for cattle and hogs. The woodlands are managed primarily to obtain woodland products, and grazing is only a secondary use.

If the areas were managed and developed properly, an estimated 51,392 acres of marshland, or 18 percent of the total acreage in the county, could be grazed profitably. Also, approximately 100,000 acres of woodland, or about 36 percent of the total acreage in the county, could be grazed without significant damage to the trees.

### Principles of range management

The operator of a range needs to know about the different forage plants on his range and the combinations in which they grow. He also needs to know his soils.

The range operator ought to manage grazing so that the best native forage plants will be encouraged and will increase. If he allows an area to be overgrazed, the more desirable kinds of plants will be suppressed and second-choice plants are likely to invade. If grazing pressure continues, the second-choice plants may be thinned out or their growth reduced and undesirable plants invade. If grazing is continued still further, even the undesirable plants may be destroyed.

The experience of research workers and ranchers indicates that, when only about half of the yearly production of grass is grazed, damage to the better plants is minimized and the range can improve. The most successful range operators manage different parts of the range so as to use the forage when it is in the best condition. They also provide reserve pastures or supplemental feed for use during periods of drought or for use at other times when the production of forage is curtailed. This permits moderate grazing at all times.

Production of native forage is influenced by (1) the range site, and by (2) the condition of the forage as the result of past grazing use and fire. On woodland range the production of forage is further influenced by the density of the timber canopy. The density of the canopy increases as the young trees become larger and the area used for range becomes more shaded. Consequently, the growth of forage plants is curtailed by both the shade and by the accumulation of pine needles that fall to the ground and smother the grass.

*Range sites.*—Management of rangeland is more easily understood if the soils are placed in range sites. A range site is an area having a distinctive combination of climate, soils, topography, and drainage, and, consequently, a definite combination of plants. The nine range sites in McIntosh County, the important soils in each, the important forage plants, the best season of use, and the comparative productivity of each site are given in table 6. Comparative productivity is expressed by numbers 1 through 9. The range site given a rating of 1 is the most productive in the county, and the range site given a rating of 9 is the least productive.

When overgrazing eliminates the more desirable plants, range condition deteriorates. *Range condition* is the present state of the vegetation as compared to the potential forage production for the range site. The ratings for range condition—*excellent, good, fair, and poor*—measure the present productivity of the range plants. A range site in excellent condition has not deteriorated to any extent and is producing more of the desirable native forage plants than other kinds of plants.

There are essentially two kinds of range sites in the county—marsh and woodland. Fresh marsh and Salt marsh are the range sites in marsh range. All the rest are in woodland range. Management of marsh and of woodland range are discussed in the following paragraphs.

### MANAGEMENT OF MARSH RANGE

Salt water marsh is better grazed in winter than in summer because the plants are more tender and nutritious during the cool season. Also, mosquitoes and other insects are less of a problem during the winter than they are in summer.

Fresh water marsh, on the other hand, is better for grazing in spring and early in summer. This is because giant cutgrass and maidencane are green and tender in spring and early in summer.

As a rule, marsh range in McIntosh County is not overstocked, but some areas have been grazed too severely. The chief unfavorable effects of grazing marsh range excessively are destruction or weakening of the more favorable kinds of forage plants. This is caused by the rooting of hogs, by the creation of boggy areas when the cover is reduced, and because the areas become eroded as the result of tidal action when overgrazing has depleted the cover.

Many marsh areas, because of the lack of firm soils or distance from high land, are unfavorable for grazing. Cattle walkways (earthen embankments resembling roadways), extending from the highlands into the more distant, firm marshes, would greatly improve grazing facilities. They have been used to advantage in other States. Water is not available for livestock in salt marshes, but wells have proved to be feasible in many areas. Reserves of feed are important to insure against losses of livestock

TABLE 6.—*Significant features of the nine important range sites*

Range site	Principal soils	Important forage plants	Best season of use	Comparative productivity <sup>1</sup>
Fresh Marsh.	Wet alluvial land.	Giant cutgrass; maidencane.	Spring and summer (March through August).	1
Salt Marsh.	Tidal marsh, high. Tidal marsh, low.	Smooth cordgrass; marshhay cordgrass; seashore saltgrass.	Winter (October through April).	2
Bladen Flatwoods.	Bayboro clay loam. Bladen loam and clay loam. Bladen-Coxville fine sandy loams. Dunbar fine sandy loam, 0 to 2 percent slopes. Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes. Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes. Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes. Fairhope fine sandy loam, 2 to 5 percent slopes. Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes. Meggett loam. Portsmouth loam. Weston loamy fine sand. Weston loamy sand, thick surface. Weston very coarse sand.	Carpetgrass; wiregrass; brownseed paspalum; sawgrass; bluestem; switchcane; maidencane.	Spring and summer (Apr. 1 to Sept. 1).	3
Sandy Flatwoods.	Blanton fine sand, 0 to 5 percent slopes. Klej fine sand, 0 to 2 percent slopes. Ona fine sand. Ona and Scranton fine sands, alkaline variants.	Bluestem; wiregrass.	Spring and summer (Apr. 1 to Sept. 1).	4
Hardpan Flatwoods.	Leon fine sand.	Bluestem; wiregrass.	Spring and summer (Apr. 15 to Sept. 1).	5
Scrub Oak Sand Ridge.	Lakeland coarse sand, deep, 2 to 5 percent slopes. Lakeland coarse sand, deep, 5 to 12 percent slopes. Lakewood coarse sand, thick surface, 5 to 8 percent slopes.	Bluestem; wiregrass.	Spring and summer (April through July).	6
Coastal Hammock.	Galestown fine sand, 0 to 2 percent slopes. Lakeland sand, 0 to 2 percent slopes. Lakeland sand, 5 to 8 percent slopes. Palm Beach fine sand, dark.	Bluestem; wiregrass; longleaf uniola.	Winter (Dec. 1 to May 1).	7
Pine-Hardwood Lowlands.	Plummer sands. Rutlege fine sand. St. Johns fine sand.	Switchcane; longleaf uniola; wildrye; eastern gamagrass; shrubs (6).	Winter (December through March).	8
Swamp.	Swamp (unclassified).	Giant cutgrass; switchcane.	Winter (December through March).	9

<sup>1</sup> Based on approximate production of forage when good range management practices are used on the marsh range sites, and good woodland management and grazing management, on the woodland sites.



during severe storms. Storing hay or providing tame pasture or upland range adjacent to the marsh range are the most feasible means of insuring against this hazard.

#### MANAGEMENT OF WOODLAND RANGE

The woodlands used for range in McIntosh County generally consist of areas in which slopes are less than 3 percent. Slash, longleaf, and loblolly pines are the predominant kinds of trees. Most of the areas have not been overgrazed. They are not eroded or are only slightly eroded.

The woodlands are managed primarily to obtain wood products, but some grazing practices are beneficial, both for the production of forage and of wood. As timber canopies develop, there is a decrease in the volume of forage. Thinning, harvesting, and removing the undergrowth and weed trees promotes the growth of the useful trees and forage plants.

Managed grazing of pine woodlands reduces the hazard of fire, contributes to the control of hardwoods, and helps the seeds of pines to come into contact with the soil. Controlled burning once in 2 to 4 years improves the quality of the native forage on woodland range (4). In burning over an area, first consideration needs to be given to the woodland stand. The benefits to range forage are thus secondary. Adjustments in the size of the herd, an increase in the amount of supplementary feed given to the animals, or expansion of the acreage in tame pastures are among the ways in which desirable forage plants can be encouraged as timber stands develop.

Cattle utilize native forage more efficiently than other kinds of livestock, but hogs also utilize the native forage. There are a few herds of goats but no sheep in the county. Cattle damage the young pine seedlings much less than either hogs or goats.

Saw-palmettoes and gallberry bushes form the understory in large areas of woodlands in the county. These shrubs are not desirable for forage and crowd out desirable forage plants. Eradication by the use of chemicals has been limited, and machine clearing is the most effective means of control. After the areas have been cleared, pines can be planted; the areas can be used as a combination of woodland and range when the trees have grown large enough so that grazing animals will not damage them; or tame pastures can be established, which can be used with adjacent areas of woodland range.

Forage on areas of woodland range is deficient in phosphorus and calcium (5). Therefore, most range operators make mineral supplements available for the livestock (7).

#### Wildlife

Fish and game in McIntosh County and in the offshore waters have attracted the interest of sportsmen for many years. Crabs, oysters, shrimp, and fish are harvested from the rivers and coastal waters. The woodlands and swamps provide habitats for white-tailed deer, turkeys, bears, squirrels, rabbits, raccoons, wildcats, foxes, opossums, doves, bobwhites, and hogs. In the marshes and rivers of the area are nesting grounds for marsh hens, gallinules, wood ducks, and many nongame birds. Waterfowl use the coastal waters as feeding grounds, especially

during the winter, when many of them migrate to the area from the north.

Many sportsmen visit the county each year to hunt or fish. Hunting clubs lease land from local owners for use of the members. Many residents are commercial fishermen, and many are employed seasonally in activities related to fishing and hunting. Shrimp and oysters are an important source of income in the county. Several plants where seafood is processed are located near coastal docks and operate seasonally. Much local interest is directed toward the expansion of shrimping in the coastal waters.

Marine research is now carried on at a marine laboratory on Sapelo Island. This laboratory is operated by the University of Georgia. On Blackbeard Island a wildlife refuge is maintained by the U.S. Department of the Interior. The Georgia Game and Fish Commission also operates a sanctuary for migratory waterfowl on Butler Island and in surrounding areas in the Altamaha River.

Management of the tidal marshes and swamps for wildlife is likely to increase in the county. Several shallow ponds in marshy areas have already been diked so that widgeongrass can be grown for ducks. A structure to control water is installed at an elevation that allows spring tides each month to flow into the pond. This system of water management is used to maintain a salt content of about one-third that of sea water (about 10,000 parts per million). Widgeongrass flourishes in water of this salinity, but undesirable plants are retarded. The approximately 77,000 acres of marshland in the county and the many fields that were formerly used to grow rice provide many possibilities for improvement for wildlife (fig. 12).



Figure 12.—An old ricefield now used as a habitat for wildlife.

The interdependence of soils, vegetation, and wildlife is much in evidence in this county. The condition of the soil determines, to a large extent, the kind of natural vegetation that will grow. As the result of differences in the kinds of vegetation, different kinds of habitats are provided for wildlife. For example, brackish marshes support salt grasses and are natural breeding grounds for marsh hens and for a few nongame species. The swamps and bays are natural habitats of bears, raccoons, squirrels, and other wild animals. Deer, wild turkeys, and certain

other kinds of game are not associated with an individual kind of soil or area but roam over many areas. Bobwhite are closely identified with the arable soils of the county, such as the Eulonia, Fairhope, Dunbar, and Lynchburg soils.

## Engineering Uses of Soils

Soil engineering is well established in engineering practice today. It is, in a broad sense, a subdivision of structural engineering because it deals with the soil as the foundation material upon which structures rest or with the soil when used as a structural material. Soils, to the engineer, are natural materials that occur in great variety over the earth. Their engineering properties vary widely from place to place, even within the relatively small confines of a single project.

Generally speaking, a soil must be used in the locality and in the condition in which it is found. A large part of soil engineering practice consists of locating the various soils, determining their engineering properties, correlating those properties with the requirements of the job, and selecting the best possible material for each job.

This soil survey contains information about the soils that will be helpful to engineers. Special emphasis has been placed on engineering properties as related to agriculture, especially on engineering properties that affect irrigation, farm ponds, structures to control and conserve soil and water, and similar items.

The information in this report will be of help in selecting and developing sites for industrial, business, residential, and recreational development; in selecting locations for highways, pipelines, and airports; in locating sand and gravel for use in construction; in correlating pavement performance with types of soil and thus develop information that will be useful in designing and maintaining the pavements; in determining the suitability of soil units for cross-country movements of vehicles and construction equipment; and in supplementing information obtained from other published maps and reports and aerial photographs for the purpose of making soil maps and reports that can be used readily by engineers.

Engineers of the Georgia State Highway Department, the United States Bureau of Public Roads, and the Soil Conservation Service collaborated with soil scientists of the Soil Conservation Service in preparing this section. It is intended to combine their knowledge of soils with information obtained through laboratory tests and field experience so that soil conditions can be interpreted appropriately for engineers in the county.

*The mapping and the description of soils in a soil survey report are somewhat generalized, however, and should be used only in planning more detailed field surveys to determine the in-place condition of the soil at the site of the proposed engineering construction.*

At many construction sites, there are major variations in the soils within the depth of the proposed excavation, and the soils may differ greatly within short distances. The maps, soil descriptions, and other information in

this report can best be used in planning for the detailed investigations necessary at the construction site. This would make possible the taking of only a minimum number of soil samples needed for laboratory testing. After the soils have been tested and their behavior, in place, has been observed under varying conditions, the engineer should be able to anticipate, to some extent, the properties of individual soil units wherever they are mapped.

In addition to information in this section, much additional information can be found in the text of the report. The engineer should refer briefly to the section "How a Soil Survey is Made" and to the section "Formation, Classification, and Morphology of Soils." He will need also to refer to the section "Descriptions of Soils," which gives descriptions of all the soils in the county.

Some of the terms used by the soil scientist may not be familiar to the engineer; other terms, though familiar, have special meanings in soil science. Most of the terms used in the tables, and other special terms used in the report, are defined in the Glossary.

The section contains three tables. Table 7 gives a brief description of the soils and describes their estimated physical properties; table 8 gives estimates of the suitability of the soils for highway construction and conservation engineering; and table 9 gives test data for the principal soils of each of seven soil series that are extensive in the county.

**Engineering classification systems.**—Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials. In this system soil materials are classified in seven principal groups. The groups range from A-1, consisting of gravelly soils of high bearing capacity, to A-7, consisting of clayey soils having low strength when wet. Within each group, the relative engineering value of the soil material can be indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest.

Some engineers prefer to use the Unified Soil Classification system. In this system soil materials are identified as coarse grained (8 classes), fine grained (6 classes), or highly organic.

The AASHO and Unified engineering soil classifications (1, 16) given in table 9 are based on data obtained by mechanical analyses and by tests made to determine liquid limits and plastic limits. Mechanical analyses were made by combined sieve and hydrometer methods.

**Engineering interpretations.**—Table 7 gives a brief description of the soils of the county, but, in general, it describes the soil material only to a depth of 6 feet. The physical properties were estimated by using field observations, experience, and laboratory tests as a basis for the estimates. These estimates apply only to the soils of McIntosh County.

In table 7 information in the column showing depth from surface (typical profile) is based on the descriptions of typical profiles given in the section "Descriptions of Soils." In the column showing permeability, an estimate is given, in inches per hour, of the rate at which

water percolates through undisturbed soil material. The column describing soil structure gives estimates of the structure in each horizon described.

In the column showing available moisture is an approximation of the capillary water in the soil when the downward flow caused by gravity has practically stopped. The column that describes reaction gives estimated pH values for each soil. The pH values indicate the degree of soil acidity, less than 7.0, or the degree of alkalinity, more than 7.0. The reaction either way, if extreme, can have an important bearing on engineering structures or on treatments to stabilize the soil.

In the column on dispersion are given estimates of the tendency of the soils to "slake" down into individual particles and thereby lose stability. The ratings in the column showing shrink-swell potential indicate the volume change in each soil; that is, the shrinking of the soil when it dries and the swelling of the soil as it takes up moisture.

Table 8 gives estimates of the suitability of the soils for highway construction and for conservation engineering. It also rates the soils according to their suitability as drainage fields for septic tanks and for oxidation ponds for sewage disposal. The estimates given in table 7 are based on experience and on tests performed by the Bureau of Public Roads on soil samples collected in the county and shown in table 9.

The ratings in table 8 in the column showing suitability for agricultural drainage are based partly on the need for removal of surface or subsurface water and on the possible difficulties, caused by the characteristics of the soil, in accomplishing this. They also reflect difficulties caused by low water-holding capacity, difficulties caused because of the poor intake capability of the surface soil, difficulties encountered in leveling a soil because of its shallow depth, and similar hazards. Each soil is given a rating of *Good*, *Fair*, or *Poor* according to its suitability for various types of construction.

**Soil test data.**—To help evaluate the soils for engineering purposes, samples, taken from 14 profiles of the principal soil types of each of 7 extensive soil series, were tested in accordance with standard procedures. The test data are given in table 9. Each soil series was sampled in two localities, and the test data show some variation in physical test characteristics. Nevertheless, the data probably do not show the maximum variation in the horizons of each of the soil series. All samples were obtained at a depth of less than 6 feet. The test data, therefore, may not be adequate for estimating the characteristics of soil materials where deep cuts are required in rolling areas.

The tests for liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from very dry, the material changes from a solid to a semisolid or plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content, on a dry basis, at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content

at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Table 9 also gives compaction (moisture-density) data for the tested soils. If a soil material is compacted at successively higher moisture content, assuming that the compactive effect remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important to earthwork, because, generally, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

**Planning engineering soil surveys.**—Many of the soil characteristics evaluated in table 8 are not apparent without field investigation; yet, they greatly influence construction practices. Desirable materials for subgrades and embankments are rather scarce in the county, but the surface layers of the soils are rated in table 8 as a source of materials for subgrades and embankments. Many soils are not suitable for winter grading, and road projects require scheduling so that construction can be done during dry periods of the year.

Such soils as Wet alluvial land, Bayboro clay loam, and Bladen loam and clay loam are poorly drained. They have slow permeability and a very high shrink-swell potential. These soils have little value as surfacing material for unpaved roads and are poor for subgrade and topdressing. In general, they have undesirable engineering properties and present definite problems. Because these soils are nearly level, outlet channels are needed to drain roadbeds. Information about the soils should make planning and selection of rights-of-way easier.

The agricultural engineer is generally concerned with the building of drainage ditches and dikes. Landowners are much interested in this type of improvement. Many of the farms in the county are located on land that has been improved by simple drainage systems, and many additional areas could be brought under cultivation. Yields of timber, in some areas of the county, can be improved by using canals to remove excess surface water (fig. 13). Some of the most intensely farmed areas of the 19th century were located on the delta of the Altamaha River. Intensive farming was made possible by dikes and ditches that controlled the water.

In 1952, a preliminary drainage survey of the county was made by engineers of the Soil Conservation Service. Five watersheds were recognized, and main canals for drainage of each watershed were outlined. Approximately 43.2 miles of main canals were proposed. By the end of 1959, about 10 miles of these canals had been constructed. Such ventures are generally beyond the means of a single individual. The pulp and paper industry, however, now recognizes many benefits of drainage, and construction of canals will probably increase.

TABLE 7.—*Brief description of soils and*

Symbol on map	Soil name	Brief site and soil description: Engineering classification of soil material	Depth from surface (typical profile)	USDA texture
BhA	Bayboro clay loam (0 to 2 percent slopes).	½ to 1½ feet of OH(A-7) over 3 to 4 feet of CH or MH(A-7); soil is very poorly drained.	Inches 0-17 17-64	Clay loam..... Clay.....
BjA	Bladen loam and clay loam (0 to 2 percent slopes). <sup>2</sup>	5 to 6 feet of CL or CH(A-7); soil is poorly drained.	0-72	Clay.....
BkA	Bladen-Coxville fine sandy loams (0 to 2 percent slopes).	6 to 14 inches of ML or OL(A-4) overlying 3 to 4 feet of CL or CH(A-7); soil is poorly drained.	0-10 10-60	Fine sandy loam..... Clay.....
BnB	Blanton fine sand, 0 to 5 percent slopes. <sup>2</sup>	42 inches or more of SP-SM(A-3); soil is moderately well drained.	0-54	Fine sand.....
Cub	Coastal beach (0 to 5 percent slopes) <sup>2</sup> .	42 inches or more of SP-SM(A-3); high in salt content.	0-42	Sands.....
DmA	Dunbar fine sandy loam, 0 to 2 percent slopes.	6 to 18 inches of SM or ML(A-2 or A-4) overlying 6 to 12 inches of ML or CL(A-4 or A-6). This, in turn, overlies 2 to 3 feet of CL or MH-CH(A-7); soil is somewhat poorly drained.	0-12 12-20 20-60	Fine sandy loam..... Sandy clay loam..... Sandy clay to clay...
Dsl	Dune land (5 to 8 percent slopes) <sup>2</sup> ...	Several feet of windblown SP or SM(A-3) in areas facing the sea, the soil materials contain some salt; excessively drained.	0-60	Sands.....
EoA	Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes.	6 to 18 inches of SM(A-2 or A-4) overlying 6 to 12 inches of CL or SC(A-4 or A-6). This, in turn, overlies 2 to 3 feet of MH-CH(A-7); soil is moderately well drained.	0-12 12-21 21-60	Fine sandy loam..... Sandy clay loam..... Clay.....
EpA	Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes. <sup>2</sup>	18 to 30 inches of SM(A-2) overlying 6 to 12 inches of SC(A-4 or A-2). This, in turn, overlies 2 feet of MH-CH(A-7); soil is moderately well drained.	0-24 24-34 34-60	Loamy fine sand..... Sandy clay loam..... Clay.....
EpB	Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes. <sup>2</sup>			
FpB	Fairhope fine sandy loam, 2 to 5 percent slopes.	6 to 12 inches of SM(A-4 or A-2) overlying 48 inches of MH-CH(A-7); soil is moderately well drained.	0-10 10-60	Fine sandy loam..... Clay.....
GrA	Galestown fine sand, 0 to 2 percent slopes.	42 inches or more of SP-SM(A-3); soil is excessively drained.	0-42	Fine sand.....
KfA	Klej fine sand, 0 to 2 percent slopes <sup>2</sup> .	42 inches or more of SP-SM(A-3); soil is somewhat poorly drained to moderately well drained.	0-42	Fine sand.....
LpA	Lakeland sand, 0 to 2 percent slopes <sup>4</sup> .	42 inches or more of SM(A-2); soil is excessively drained.	0-42	Sand.....
LpC	Lakeland sand, 5 to 8 percent slopes. <sup>4</sup>			
LwB	Lakeland coarse sand, deep, 2 to 5 percent slopes.	More than 72 inches of SP(A-3); soil is excessively drained.	0-96	Coarse sand.....
LwC	Lakeland coarse sand, deep, 5 to 12 percent slopes.			
LxC	Lakewood coarse sand, thick surface, 5 to 8 percent slopes. <sup>2</sup>	42 inches or more of SP(A-3); soil is excessively drained.	0-42	Sand.....
LrA	Leon fine sand (0 to 2 percent slopes). <sup>5</sup>	12 to 24 inches of SP-SM(A-3) overlying 2 to 6 inches of SM(A-2). This, in turn, overlies 2 feet of SP-SM(A-3); soil is poorly drained.	0-52	Fine sand.....
LuA	Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes.	18 to 30 inches of SM(A-2) overlying 6 to 12 inches of SC(A-4 or A-2). This, in turn, overlies 2 feet of CL(A-7); soil is somewhat poorly drained.	0-24 24-36 36-60	Loamy fine sand..... Sandy clay loam..... Sandy clay or clay...

See footnotes at end of table.

*physical properties significant to engineering*

Grain sizes			Permeability	Soil structure	Available moisture	Reaction	Dispersion	Shrink-swell potential
Passing No. 200 sieve (0.074 mm.)	Passing No. 40 sieve (0.042 mm.)	Passing No. 10 sieve (2.0 mm.)						
<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Inches per hour</i>		<i>Inches per foot</i>	<i>pH</i>		
65-77	86-94	100	0.05-0.2	Crumb to angular blocky	1.5	4.5-5.0	Low-----	High.
72-81	90-95	100	( <sup>1</sup> )	Angular blocky-----	1.6	4.5-5.0	Very low---	Very high.
71-85	95-100	100	( <sup>1</sup> )	Angular blocky-----	1.6	4.5-6.0	Very low---	Very high.
53-64	83-98	100	0.2-0.8	Granular-----	1.7	4.5-6.0	Moderate---	Low.
64-81	98-100	100	( <sup>1</sup> )	Subangular blocky---	1.6	4.5-6.0	Very low---	Very high.
7-9	100	100	2.5-5.0	Single grain-----	1.0	4.5-6.0	Very high---	Very low.
9	93-96	100	( <sup>3</sup> )	Single grain-----	.5	7.0-8.0	Very high---	Very low.
34-85	95-98	100	0.8-2.5	Granular-----	1.4	4.5-6.0	High-----	Low.
55-60	96-99	100	0.8-2.5	Subangular blocky-----	1.3	4.5-5.5	Moderate---	Moderate.
54-75	97-100	100	0.2-0.8	Angular blocky-----	1.3	4.0-5.0	Low-----	High.
9	91-97	100	( <sup>3</sup> )	Single grain-----	.5	5.5-7.5	Very high---	Very low.
29-50	96-98	100	0.8-2.5	Granular-----	1.2	4.5-5.5	Moderate---	Low.
41-60	97-99	100	0.2-0.8	Subangular blocky-----	1.5	4.0-5.5	Low-----	Moderate.
62-77	98-100	100	( <sup>1</sup> )	Angular blocky-----	1.4	4.0-5.0	Low-----	High.
17-20	92-96	100	5.0-10.0	Granular-----	1.2	4.5-5.5	High-----	Low.
35-42	96-98	100	0.8-2.5	Subangular blocky-----	1.5	4.0-5.5	Moderate---	Moderate.
52-77	98-100	100	( <sup>1</sup> )	Angular blocky-----	1.4	4.0-5.0	Low-----	High.
33-50	97-98	100	0.8-2.5	Granular-----	1.2	4.5-5.5	Moderate---	Low.
62-76	99-100	100	( <sup>1</sup> )	Angular blocky-----	1.4	4.0-5.0	Low-----	High.
8-10	100	100	5.0-10.0	Single grain-----	.7	4.5-5.5	Very high---	Very low.
7-9	100	100	2.5-5.0	Single grain-----	1.0	4.5-6.0	Very high---	Very low.
13	94-98	100	5.0-10.0	Single grain-----	.6	4.5-6.0	High-----	Low.
2	79-82	100	( <sup>3</sup> )	Single grain-----	.4	4.5-5.5	High-----	Very low.
2	78-81	100	( <sup>3</sup> )	Single grain-----	.4	4.0-5.0	High-----	Very low.
5-9	94-98	100	2.5-5.0	Single grain (cemented layer is massive).	.7	4.0-5.0	High-----	Low.
17-20	91-95	100	5.0-10.0	Granular-----	1.0	4.5-6.0	High-----	Low.
35-42	91-97	100	0.8-2.5	Subangular blocky-----	1.0	4.5-5.5	Moderate---	Moderate.
54-75	93-98	100	0.2-0.8	Angular blocky-----	1.0	4.0-5.0	Low-----	High.



TABLE 7.—*Brief description of soils and*

Symbol on map	Soil name	Brief site and soil description: Engineering classification of soil material	Depth from surface (typical profile)	USDA texture
MBA	Meggett loam (0 to 2 percent slopes). <sup>2</sup>	6 to 12 inches of ML or OL(A-4) overlying 48 inches of CH(A-7) containing varying amounts of marl; soil is poorly drained.	Inches 0-8 8-60	Loam----- Clay-----
ObA	Ona fine sand (0 to 2 percent slopes). <sup>5</sup>	8 to 15 inches of SP-SM or SM(A-2) overlying 42 inches of SP-SM(A-3); soil is somewhat poorly drained.	0-12 12-60	Fine sand----- Fine sand-----
OsA	Ona and Scranton fine sands, alkaline variants (0 to 2 percent slopes). <sup>2</sup>	42 inches or more of SP-SM or SM(A-2); in places contains fragments of oystershells.	0-60	Fine sand-----
PdA	Palm Beach fine sand, dark (0 to 2 percent slopes). <sup>2</sup>	42 inches or more of SP-SM or SM(A-2); surface layers contain varying amounts of fragments of oystershells; soil is excessively drained.	0-60	Fine sand-----
PeA	Plummer sands (0 to 2 percent slopes). <sup>5</sup>	30 to 42 inches of SP-SM(A-3) overlying 12 or more inches of SC(A-2 or A-6); soil is poorly drained.	0-36 36-60	Sand----- Sandy clay-----
Por	Portsmouth loam (0 to 2 percent slopes). <sup>2</sup>	8 to 18 inches of OL(A-4) overlying 36 inches or more of SC(A-4 or A-6); soil is very poorly drained.	0-12 12-42	Loam----- Sandy clay loam-----
RkA	Rutlege fine sand (0 to 2 percent slopes). <sup>5</sup>	8 to 18 inches of SP-SM(A-2) overlying 24 inches or more of SP-SM(A-3); soil is very poorly drained.	0-12 12-42	Fine sand----- Fine sand-----
Stj	St. Johns fine sand (0 to 2 percent slopes). <sup>2</sup>	6 to 18 inches of SM(A-2) overlying 24 inches or more of SP-SM(A-3); soil is very poorly drained.	0-16 16-42	Fine sand----- Fine sand-----
Swa	Swamp <sup>2</sup> -----	Overflow areas of the river flood plains consisting of various textures; alluvial soil materials; very poorly drained.	0-42	Variable-----
Tml	Tidal marsh, low <sup>4</sup> -----	Soil material variable, but is generally several feet of MH-CH or OH(A-5 or A-7); high in salt content.	0-42	Clay-----
Tmh	Tidal marsh, high <sup>2</sup> -----	Soil material is variable, but is generally 1 to 3 feet of SM(A-2) overlying 2 or more feet of MH-CH(A-5 or A-7); high in salt content.	0-24 24-42	Sands----- Clay-----
Wst	Weston loamy sand, thick surface (0 to 2 percent slopes).	18 to 30 inches of SM(A-2) overlying 24 inches or more of SC(A-6 or A-7); soil is poorly drained.	0-24 24-42	Loamy sand----- Sandy clay loam-----
Wes	Weston loamy fine sand (0 to 2 percent slopes). <sup>2</sup>	6 to 18 inches of SM(A-2) overlying 6 to 12 inches of SC(A-6). This, in turn, overlies 24 inches or more of CL(A-7); soil is poorly drained.	0-12 12-20 20-42	Loamy fine sand----- Sandy clay loam----- Sandy clay-----
Wet	Weston very coarse sand (0 to 2 percent slopes). <sup>2</sup>	8 to 30 inches of SM(A-2) overlying 30 inches or more of CL(A-6); soil is poorly drained.	0-12 12-42	Loamy coarse sand----- Sandy clay-----
Wtl	Wet alluvial land (0 to 2 percent slopes). <sup>4</sup>	2 to 3 feet of CH or MH(A-7) overlying 2 to 3 feet of OH(A-7); soil is very poorly drained.	0-32 32-60	Clay----- Clay-----

<sup>1</sup> Less than 0.05.<sup>2</sup> Characteristics estimated.<sup>3</sup> Greater than 10.0.<sup>4</sup> Data supplied by Georgia State Highway Department.

*physical properties significant to engineering—Continued*

Grain sizes			Permeability	Soil structure	Available moisture	Reaction	Dispersion	Shrink-swell potential
Passing No. 200 sieve (0.074 mm.)	Passing No. 40 sieve (0.042 mm.)	Passing No. 10 sieve (2.0 mm.)						
<i>Percent</i> 60-64 75-81	<i>Percent</i> 90-95 92-96	<i>Percent</i> 100 85	<i>Inches per hour</i> 0.2-0.8 0.05-0.2	Granular----- Angular blocky-----	<i>Inches per foot</i> 1.6 1.5	<i>pH</i> 6.0-7.0 6.5-7.5	Moderate-- Low-----	Moderate. Very high.
11-14 7	87-90 91-95	100 100	2.5-5.0 2.5-5.0	Granular to single grain-- Single grain-----	1.0 1.0	4.0-5.5 4.0-5.5	High----- High-----	Low. Low.
11-14	87-91	95	2.5-5.0	Granular to single grain--	1.0	6.5-7.5	High-----	Low.
10	87-92	95	5.0-10.0	Granular to single grain--	.7	7.0-8.5	High-----	Low.
5-7 35-40	93-97 94-98	100 100	5.0-10.0 0.2-0.8	Single grain----- Massive-----	1.0 1.2	4.0-5.5 4.0-5.0	High----- Low-----	Low. Moderate.
60-64 35-42	95-98 96-98	100 100	0.8-2.5 0.2-0.8	Crumb----- Subangular blocky-----	1.4 1.2	4.0-5.0 4.0-5.0	Moderate-- Low-----	Moderate. Moderate.
11 3	93-95 92-94	100 100	5.0-10.0 0.2-0.8	Granular----- Single grain-----	1.2 1.0	4.0-5.0 4.0-5.0	High----- High-----	Low. Low.
13 3	91-96 94-97	100 100	0.5-10.0 0.2-0.8	Granular to single grain-- Single grain-----	1.0 1.0	4.0-5.0 4.0-5.0	High----- High-----	Low. Low.
						4.0-5.5		
77	96-100	96-100	0.05-0.2	Massive-----	1.5	7.0-8.0	Very low--	Very high.
13 77	85-91 96-100	100 100	5.0-10.0 0.05-0.2	Single grain----- Massive--	.7 1.5	7.0-8.0 7.0-8.0	Very high-- Very low--	Very low. Very high.
17-20 36-42	75-86 71-88	100 100	5.0-10.0 0.2-0.8	Granular----- Subangular blocky-----	1.5 1.5	4.0-5.5 4.0-5.0	High----- Moderate--	Low. Moderate.
17-20 41-42 54	77-88 73-90 95-98	100 100 100	2.5-5.0 0.2-0.8 0.2-0.8	Granular----- Subangular blocky----- Massive-----	1.6 1.5 1.5	4.0-5.5 4.0-5.0 4.0-5.0	High----- Moderate. Low-----	Low. Moderate. High.
17-20 54	61-67 89-94	90 98	5.0-10.0 0.2-0.8	Granular----- Massive-----	1.4 1.5	4.0-5.5 4.0-5.0	High----- Low-----	Low. High.
87 89	99-100 99-100	100 100	0.05-0.2 0.05-0.2	Massive----- Massive-----	1.5 1.5	4.0-6.5 4.0-4.5	Very low-- Very low--	Very high. Very high.

<sup>5</sup> Data from Sarasota County, Fla.<sup>6</sup> Marl nodules retained on No. 10 and on No. 40 sieves.<sup>7</sup> Fragments of oystershells retained on No. 10 and on No. 40 sieves.<sup>8</sup> Some roots remained on the No. 10 screen.

TABLE 8.—*Estimated suitability of the soils of McIntosh*

[Except as indicated, rating

Symbol on map	Soil name	Depth to seasonally high water table	Suitability of soil material for—		
			Wet weather grading <sup>1</sup>	Road subgrade <sup>1</sup>	Road embankment
BhA	Bayboro clay loam.....	At or on the surface.	Poor.....	Poor.....	Poor.....
BjA	Bladen loam and clay loam.....	At or on the surface.	Poor.....	Poor.....	Poor.....
BkA	Bladen-Coxville fine sandy loams.....	At or on the surface.	Poor.....	Poor.....	Poor.....
BnB	Blanton fine sand, 0 to 5 percent slopes.	1 to 2 <sup>3</sup> .....	Fair.....	Poor to good.....	Good.....
Cub	Coastal beach.....	Covered by tides..	Poor.....	Fair.....	Fair.....
DmA	Dunbar fine sandy loam, 0 to 2 percent slopes.	1 <sup>3</sup> .....	Poor.....	Fair to a depth of 18 inches.	Fair to a depth of 18 inches.
Dsl	Dune land.....	6 to 30.....	Good.....	Fair.....	Fair.....
EoA	Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes.	2 to 3.....	Fair.....	Fair to a depth of 18 inches.	Fair to a depth of 18 inches.
EpA	Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes.	2 to 3.....	Fair.....	Fair to good to a depth of 30 inches.	Good to a depth of 30 inches.
EpB	Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes.	2 to 3.....	Fair.....	Fair to good to a depth of 30 inches.	Good to a depth of 30 inches.
FpB	Fairhope fine sandy loam, 2 to 5 per- cent slopes.	2 to 3.....	Good.....	Poor.....	Fair to a depth of 12 inches.
GrA	Galestown fine sand, 0 to 2 percent slopes.	4 to 8.....	Good.....	Fair to good.....	Good.....
KfA	Klej fine sand, 0 to 2 percent slopes....	1 to 2 <sup>3</sup> .....	Fair.....	Fair to good.....	Good.....
LpA	Lakeland sand, 0 to 2 percent slopes....	4 to 8.....	Good.....	Fair to good.....	Good.....
LpC	Lakeland sand, 5 to 8 percent slopes....	4 to 8.....	Good.....	Fair to good.....	Good.....
LwB	Lakeland coarse sand, deep, 2 to 5 per- cent slopes.	6 to 20.....	Good.....	Poor.....	Fair.....
LwC	Lakeland coarse sand, deep, 5 to 12 percent slopes.	6 to 20.....	Good.....	Poor.....	Fair.....
LxC	Lakewood coarse sand, thick surface, 5 to 8 percent slopes.	6 to 20.....	Good.....	Poor.....	Fair.....
LrA	Leon fine sand.....	1 to 2 <sup>3</sup> .....	Fair.....	Fair to good.....	Good.....
LuA	Lynchburg loamy fine sand, thick sur- face, clayey substratum, 0 to 2 per- cent slopes.	1 <sup>3</sup> .....	Poor.....	Good.....	Good.....
MBA	Meggett loam.....	At or on the surface.	Poor.....	Poor.....	Poor.....
ObA	Ona fine sand.....	1 to 2 <sup>3</sup> .....	Fair.....	Good.....	Good.....
OsA	Ona and Scranton fine sands, alkaline variants.	1 to 2 <sup>3</sup> .....	Fair.....	Good.....	Good.....
PdA	Palm Beach fine sand, dark.....	4 to 8.....	Good.....	Fair to good.....	Good.....
PeA	Plummer sands.....	At or on the surface. <sup>2</sup>	Poor.....	Fair to good to a depth of 24 inches.	Fair to good to a depth of 24 inches.
Por	Portsmouth loam.....	At or on the surface.	Poor.....	Poor.....	Poor.....
RkA	Rutlege fine sand.....	At or on the surface. <sup>2</sup>	Fair.....	Fair to good.....	Poor.....
Stj	St. Johns fine sand.....	At or on the surface. <sup>2</sup>	Fair.....	Fair to good.....	Poor.....
Swa	Swamp.....	Floods frequently..	Poor.....	Poor.....	Poor.....
Tml	Tidal marsh, low.....	Covered by tides..	Poor.....	Poor.....	Poor.....
Tmh	Tidal marsh, high.....	Covered by tides..	Poor.....	Poor.....	Poor.....

See footnotes at end of table.

County for use in various kinds of construction

is for entire profile]

Suitability as source of—		Suitability for—					
Sand <sup>1</sup>	Vegetative topsoil <sup>1</sup> (uppermost 12 inches)	Ponds for wildlife		Agricultural drainage	Irrigation	Drainage fields for septic tanks	Sewage disposal oxidation ponds
		Reservoir area	Embankment				
Poor.....	Poor.....	Good.....	Poor to fair <sup>2</sup> ...	Poor ..	Poor.....	Poor.....	Poor.
Poor.....	Poor.....	Good.....	Poor to fair <sup>2</sup> ...	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Fair.....	Good.....	Poor to fair <sup>2</sup> ...	Poor.....	Poor.....	Poor.....	Poor.
Fair.....	Fair to poor...	Fair to poor...	Fair to poor...	Poor to fair...	Poor to fair...	Poor.....	Poor.
Fair.....	Poor.....	Poor.....	Poor.....	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Good.....	Good to fair...	Good to fair...	Poor.....	Fair.....	Poor.....	Poor.
Fair.....	Poor.....	Poor.....	Poor.....	Good.....	Poor.....	Good.....	Fair.
Poor.....	Good.....	Fair to good...	Fair to good...	Fair to good...	Good.....	Fair to good...	Poor.
Poor.....	Good.....	Fair to good...	Fair to good...	Fair to good...	Good.....	Fair to good...	Poor.
Poor.....	Good.....	Fair to good...	Fair to good...	Fair to good...	Good.....	Fair to good...	Poor.
Poor.....	Good.....	Fair to good...	Fair to good...	Fair to good...	Good.....	Fair to good...	Poor.
Poor.....	Good.....	Fair to good...	Fair to good...	Fair to good...	Good.....	Fair to good...	Poor.
Fair to good...	Fair.....	Poor.....	Poor.....	Good.....	Poor <sup>4</sup> .....	Good.....	Fair.
Fair.....	Fair to poor...	Fair to poor...	Fair to poor...	Poor to fair...	Poor to fair...	Poor.....	Poor.
Fair to good...	Fair.....	Poor.....	Poor.....	Good.....	Poor <sup>4</sup> .....	Good.....	Fair.
Fair to good...	Fair.....	Poor.....	Poor.....	Good.....	Poor <sup>4</sup> .....	Good.....	Fair.
Fair.....	Poor.....	Poor.....	Poor.....	Good.....	Poor <sup>4</sup> .....	Good.....	Fair.
Fair.....	Poor.....	Poor.....	Poor.....	Good.....	Poor <sup>4</sup> .....	Good.....	Fair.
Fair.....	Fair to poor...	Fair to poor...	Fair to poor...	Poor to fair...	Poor to fair...	Poor.....	Poor.
Poor.....	Good.....	Good to fair...	Good to fair...	Poor.....	Fair.....	Poor.....	Poor.
Poor.....	Fair.....	Good.....	Poor to fair <sup>2</sup> ...	Poor.....	Poor.....	Poor.....	Poor.
Fair.....	Fair to poor...	Fair to poor...	Fair to poor...	Poor to fair...	Poor to fair...	Poor.....	Poor.
Fair.....	Fair to poor...	Fair to poor...	Fair to poor...	Poor to fair...	Poor to fair...	Poor.....	Poor.
Fair to good...	Fair.....	Poor.....	Poor.....	Good.....	Poor <sup>4</sup> .....	Good.....	Fair.
Fair.....	Fair.....	Fair.....	Fair.....	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Fair.....	Good.....	Poor to fair <sup>2</sup> ...	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Fair.....	Fair.....	Fair.....	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Fair.....	Fair.....	Fair.....	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Poor.....	Good to fair...	Poor <sup>2</sup> .....	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Poor.....	Fair.....	Fair <sup>2</sup> .....	Poor.....	Poor.....	Poor.....	Poor.
Poor.....	Poor.....	Fair.....	Fair <sup>2</sup> .....	Poor.....	Poor.....	Poor.....	Poor.

TABLE 8.—*Estimated suitability of the soils of McIntosh*

[Except as indicated, rating

Symbol on map	Soil name	Depth to seasonally high water table	Suitability of soil material for—		
			Wet weather grading <sup>1</sup>	Road subgrade <sup>1</sup>	Road embankment
Wst	Weston loamy sand, thick surface.....	At or on the surface. <sup>2</sup>	Poor.....	Fair to good to a depth of 24 inches.	Fair to good to a depth of 24 inches.
Wes	Weston loamy fine sand.....	At or on the surface. <sup>2</sup>	Poor.....	Fair to good to a depth of 24 inches.	Fair to good to a depth of 24 inches.
Wet	Weston very coarse sand.....	At or on the surface. <sup>2</sup>	Good to a depth of 12 inches.	Good to a depth of 12 inches.	Good to a depth of 12 inches.
Wtl	Wet alluvial land.....	Floods frequently..	Poor.....	Poor.....	Poor.....

<sup>1</sup> Rating of soil based on recommendations by the materials-testing personnel, 5th Division, Georgia State Highway Department.<sup>2</sup> Soil susceptible to piping.TABLE 9.—*Engineering test data for soil*

Soil name and location	Parent material	Bureau of Public Roads report number	Depth	Horizon	Moisture-density <sup>2</sup>	
					Maximum dry density	Optimum moisture content
Bayboro clay loam: 4.5 miles E. of Townsend on State Highway 99 in Youngs Swamp.	Marine clay of the Pamlico marine terrace.	S34789..... S34790..... S34791.....	<i>Inches</i> 1-14 19-32 38-52	A <sub>1</sub> ..... B <sub>2g</sub> ..... C <sub>2g</sub> .....	<i>Lb. per cu. ft.</i> 92 97 100	<i>Percent</i> 25 23 22
1 mile SE. of Townsend on State Highway 99.	Marine clay of the Pamlico marine terrace.	S34786..... S34787..... S34788.....	0-10 17-25 36-64 +	A <sub>1</sub> ..... B <sub>2g</sub> ..... C <sub>g</sub> .....	75 91 90	37 26 27
Bladen fine sandy loam: 1 mile E. of Eulonia.....	Clay and sandy clay of the Pamlico marine terrace.	S33376..... S33377..... S33378.....	0-3 15-26 42-50	A <sub>1</sub> ..... B <sub>2g</sub> ..... C <sub>g</sub> .....	93 105 96	22 19 24
2 miles N. of Townsend.....	Clay and sandy clay of the Pamlico marine terrace.	S33379..... S33380..... S33381.....	0-5 14-30 41-57	A <sub>1</sub> ..... B <sub>2g</sub> ..... C <sub>1g</sub> .....	109 95 103	13 22 20
Dunbar fine sandy loam: 2 miles N. of Townsend.....	Sandy clay loams and fine sandy loams of the Pamlico marine terrace.	S33385..... S33386..... S33387.....	0-5 17-24 33-48	A <sub>1</sub> ..... B <sub>22g</sub> ..... D <sub>2g</sub> .....	113 123 107	11 11 18
1 mile E. of Eulonia.....	Sandy clay loams and fine sandy loams of the Pamlico marine terrace.	S33382..... S33383..... S33384.....	0-3 9-16 21-31	A <sub>1</sub> ..... B <sub>2g</sub> ..... D <sub>2g</sub> .....	106 118 102	15 13 20
Eulonia fine sandy loam: 1 mile E. of Eulonia.....	Sandy loam over clay or sandy clay of the Pamlico marine terrace.	S33391..... S33392..... S33393.....	0-4 11-18 24-34	A <sub>11</sub> ..... B <sub>2</sub> ..... C <sub>1</sub> .....	88 112 96	22 17 22
3.6 miles S. of Eulonia.....	Sandy loam over clay or sandy clay of the Pamlico marine terrace.	S33388..... S33389..... S33390.....	0-5 14-22 33-43	A <sub>11</sub> ..... B <sub>2</sub> ..... D <sub>12</sub> .....	107 119 114	12 13 15

See footnotes at end of table.



## County for use in various kinds of construction—Continued

is for entire profile]

Suitability as source of—		Suitability for—					
Sand <sup>1</sup>	Vegetative topsoil <sup>1</sup> (uppermost 12 inches)	Ponds for wildlife		Agricultural drainage	Irrigation	Drainage fields for septic tanks	Sewage disposal oxidation ponds
		Reservoir area	Embankment				
Fair-----	Fair-----	Fair-----	Fair-----	Poor-----	Poor-----	Poor-----	Poor.
Fair-----	Fair-----	Fair-----	Fair-----	Poor-----	Poor-----	Poor-----	Poor.
Good to a depth of 12 inches.	Fair-----	Fair-----	Fair-----	Poor-----	Poor-----	Poor-----	Poor.
Poor-----	Poor-----	Good to fair--	Poor <sup>2</sup> -----	Poor-----	Poor-----	Poor-----	Poor.

<sup>3</sup> Areas need drainage when used as a source of borrow materials.<sup>4</sup> Low water-holding capacity.samples taken from 14 soil profiles <sup>1</sup>

Mechanical analyses <sup>3</sup>								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—				Percentage smaller than—						AASHO <sup>4</sup>	Unified <sup>5</sup>
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	86	75	65	63	54	47	41	51	21	A-7-5(12)---	CH.
100	90	82	72	71	64	55	50	66	39	A-7-6(19)---	CH.
100	92	85	78	76	69	62	56	72	45	A-7-6(20)---	CH.
100	94	89	77	73	60	42	32	60	17	A-7-5(15)---	CH.
100	94	89	79	76	64	51	45	52	23	A-7-6(16)---	MH-CH.
100	95	91	81	78	66	56	49	54	24	A-7-5(16)---	MH-CH.
100	98	96	64	57	35	22	18	36	9	A-4(6)-----	ML or OL.
100	99	98	71	66	56	45	41	45	22	A-7-6(13)---	CL.
-----	100	99	81	76	65	56	54	69	34	A-7-6(20)---	CH.
100	96	93	53	28	18	9	6	( <sup>6</sup> )	( <sup>6</sup> )	A-4(4)-----	ML or OL.
100	99	98	75	71	62	57	55	64	35	A-7-6(20)---	CH.
100	99	97	64	59	52	47	45	48	25	A-7-6(13)---	CL.
100	95	88	34	26	17	8	6	( <sup>6</sup> )	( <sup>6</sup> )	A-2-4(0)---	SM.
100	96	91	55	35	27	19	15	21	5	A-4(4)-----	ML-CL.
100	97	32	54	50	44	40	38	44	22	A-7-6(9)---	CL.
100	98	96	85	40	26	12	8	( <sup>6</sup> )	( <sup>6</sup> )	A-4(8)-----	ML or OL.
100	99	97	60	54	41	28	23	26	11	A-6(5)-----	CL.
-----	100	99	75	72	59	50	48	54	26	A-7-6(17)---	MH-CH.
100	96	91	45	40	26	14	8	( <sup>6</sup> )	( <sup>6</sup> )	A-4(2)-----	SM.
100	98	95	60	55	40	33	29	33	15	A-6(7)-----	CL.
100	98	96	69	67	61	58	56	63	30	A-7-5(18)---	MH-CH.
100	97	94	29	24	15	9	5	( <sup>6</sup> )	( <sup>6</sup> )	A-2-4(0)---	SM.
100	97	94	41	36	30	25	23	28	10	A-4(1)-----	SC.
100	98	96	35	31	28	26	25	32	12	A-2-6(0)---	SC.

TABLE 9.—*Engineering test data for soil*

Soil name and location	Parent material	Bureau of Public Roads report num- ber	Depth	Horizon	Moisture-density <sup>2</sup>	
					Maximum dry density	Optimum moisture content
Fairhope fine sandy loam: 1 mile E. of Eulonia.....	Heavy clay or fine sandy clay of the Pamlico marine terrace.	S33397.....	0-5	A <sub>1</sub> .....	97	19
		S33398.....	16-24	B <sub>22</sub> .....	98	23
		S33399.....	32-47	C <sub>1</sub> .....	97	22
6 miles N. of Darien and 1 mile W. of U.S. Highway 17.	Heavy clay or fine sandy clay of the Pamlico marine terrace.	S33394.....	0-6	A <sub>p</sub> .....	105	15
		S33395.....	12-19	B <sub>2</sub> or BD <sub>2</sub>	98	23
		S33396.....	28-41	C <sub>1</sub> or D <sub>1</sub> ..	105	18
Galestown fine sand: 2.5 miles E. of Meridian.....	Marine sands on old beach ridges.	S33400.....	0-7	A <sub>p</sub> .....	104	14
		S33401.....	12-29	B <sub>2</sub> .....	104	14
		S33402.....	29-44	C <sub>1g</sub> .....	104	16
0.5 mile W. of Meridian.....	Marine sands on old beach ridges.	S33403.....	2-10	B <sub>1</sub> .....	104	14
		S33404.....	10-27	B <sub>2</sub> .....	102	16
		S33405.....	27-43	C <sub>1g</sub> .....	102	17
Weston loamy fine sand: 2.1 miles SE. of Townsend.....	Medium-textured materials of the Pamlico marine terrace.	S34792.....	0-5	A <sub>1</sub> .....	118	11
		S34793.....	31-44	B <sub>2</sub> .....	112	16
		S34794.....	44-66	C.....	114	14
1.1 miles SE. of Townsend.....	Medium-textured materials of the Pamlico marine terrace.	S34795.....	0-6	A <sub>11</sub> .....	113	13
		S34796.....	23-34	B <sub>2</sub> .....	110	16
		S34797.....	34-57	C <sub>1</sub> .....	116	14

<sup>1</sup> Tests performed by the Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (AASHO).

<sup>2</sup> Based on T 99-57, Method A, "The Moisture-Density Relations of Soils Using a 5.5-lb. Rammer and a 12-in. Drop," AASHO Designation.

<sup>3</sup> Mechanical analyses according to AASHO Designation T 88. Frequently, results by this procedure differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette

*samples taken from 14 soil profiles*<sup>1</sup>—Continued

Mechanical analyses <sup>3</sup>								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—				Percentage smaller than—						AASHO <sup>4</sup>	Unified <sup>5</sup>
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	97	94	50	42	28	15	10	30	5	A-4(3)-----	SM.
100	99	98	76	72	64	56	54	64	32	A-7-5(20)---	MH-CH.
-----	100	99	77	73	65	58	56	61	30	A-7-5(20)---	MH-CH.
100	98	96	33	27	19	11	6	( <sup>6</sup> )	( <sup>6</sup> )	A-2-4(0)---	SM.
100	99	98	70	68	62	57	54	64	33	A-7-5(18)---	MH-CH.
-----	100	99	62	58	49	45	42	55	30	A-7-6(15)---	CH.
100	99	94	10	9	9	8	6	( <sup>6</sup> )	( <sup>6</sup> )	A-3(0)-----	SP-SM.
-----	100	95	9	9	8	8	7	( <sup>6</sup> )	( <sup>6</sup> )	A-3(0)-----	SP-SM.
-----	100	94	8	7	6	6	5	( <sup>6</sup> )	( <sup>6</sup> )	A-3(0)-----	SP-SM.
-----	100	98	10	9	8	7	6	( <sup>6</sup> )	( <sup>6</sup> )	A-3(0)---	SP-SM.
-----	100	99	9	8	7	6	5	( <sup>6</sup> )	( <sup>6</sup> )	A-3(0)-----	SP-SM.
-----	100	99	20	10	9	7	6	( <sup>6</sup> )	( <sup>6</sup> )	A-2-4(0)---	SM.
100	75	55	17	15	12	7	3	( <sup>6</sup> )	( <sup>6</sup> )	A-2-4(0)---	SM.
100	80	65	41	40	36	31	27	35	17	A-6(3)-----	SC.
100	71	55	35	33	30	28	26	37	18	A-2-6(2)---	SC.
100	86	68	20	18	12	8	4	( <sup>6</sup> )	( <sup>6</sup> )	A-2-4(0)---	SM.
100	88	75	42	40	36	31	27	42	25	A-7-6(6)---	SC.
100	88	73	36	34	32	28	25	36	21	A-6(2)-----	SC.

method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming the textural classes of soils.

<sup>4</sup> Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 7): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145-49 (1).

<sup>5</sup> Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1, Waterways Expt. Sta., Corps of Engineers, March 1953 (16).

<sup>6</sup> Nonplastic.



Figure 13.—Tramroad canal northwest of Townsend.

## ***Additional Facts About the County***

This section gives facts about the organization and settlement of the county. It also describes the agriculture of the county and gives information about the climate and water supplies.

### **Organization and Settlement**

Until 1686, the area that is now McIntosh County was under the influence of the Spaniards. Agriculture at the Spanish missions consisted of growing fruit and other crops for food. The first English settlement in the State was made in 1721 at Fort King George, east of the present site of the town of Darien. Then, in 1735, Scots, who were directed by Lord Oglethorpe, established the town of New Inverness. Later, the name of this town was changed to Darien. The settlers used the great hardwoods and yellow pines in the area for constructing homes and other buildings in the settlements. They grew barley, corn, oats, wheat, turnips, potatoes, and other crops for food.

In 1793, McIntosh County was formed from a part of Liberty County, but part of it was returned to Liberty County in 1874. Because of frequent, destructive sea raids, little development took place in the county prior to

the War of 1812. After the war, however, sawmills were established at Darien and on the islands.

In 1834, large lumberyards were established at Darien and at other points accessible to the sea. Large lumbering operations, which continued throughout the rest of the century, were begun. Exporting of lumber became the leading industry in the county, and businesses that depended on it thrived. When the original forests were exhausted, the industry dwindled. The naval stores industry became prominent during the ensuing period, and operations related to that industry still continue, although on a lesser scale.

After the War of 1812, large estates were established on the islands and along the coast. The owners grew indigo and sea-island cotton on the sandy soils in the eastern part of the mainland. They also diked nearly all of the islands in the delta of the Altamaha River so that they could grow rice. In 1859, 5,800 acres of rice, which yielded 195,000 bushels, was grown in the county according to reports of the U.S. Bureau of the Census. Rice continued to be grown extensively for a number of years (8), but the acreage gradually decreased. By 1898, many fields had been abandoned. After World War I, rice was no longer important in the county and the fields were neglected. Many old fields, once used to grow rice, are now idle, but some of them are used as refuges for wildlife.

## Agriculture <sup>3</sup>

Many of the soils of McIntosh County are not well suited to agriculture. Much of the county, or approximately 84 percent of the acreage, is poorly drained. Nevertheless, the soils used for crops are generally productive and respond well to management. In 1959, there were 81 farms in the county. On most of these farms, drainage was required.

### Size and types of farms

In 1959, there were 56,564 acres, or 20.5 percent of the total acreage in the county, in farms. The farms averaged approximately 698 acres in size.

Most of the farms are of the general type or are used mainly to grow products for home use. Twenty commercial farms, largely on the Eulonia-Fairhope, Lynchburg, Dunbar, and other more arable soils, are located in the county. One dairy farm is located in an area of poorly drained soils. Extensive drainage has been installed to make the soils suitable for cultivation. Thirty-five farms are operated on a part-time basis.

### Crops

Most of the cultivated acreage in the county is used to grow corn, but a smaller acreage is in oats or in potatoes, beans, peas, and other truck crops, which are grown mainly for home use. Corn yields an average of about 45 bushels per acre when moderate amounts of fertilizer are applied, and other crops make comparable yields. Corn commonly receives about 40 pounds of nitrogen per acre and 50 pounds each of phosphate and potash. There were 645 tons of commercial fertilizer used in the county in 1959, compared with 135 tons used in 1954. This was used on 1,725 acres of land.

### Livestock

In 1959, a large part of the income from the sale of farm products in McIntosh County was derived from the sale of livestock and livestock products. There was a total of 1,812 head of cattle and 991 hogs on farms. A number of wild hogs roam the county.

Few purebred animals are raised in the county, and little feed is grown for livestock. The animals are allowed to roam in the woodlands and marshes, where they can obtain most of their food from the native plants. A small acreage is in improved pasture, however, and a few areas are in native pasture, which is largely idle cropland.

## Climate

The coastal waters of the Atlantic Ocean have a moderating influence on the climate of McIntosh County, especially on temperatures. The maximum temperatures in summer are generally lower along the coast than the temperatures at inland points near the same latitude, and the minimum temperatures in winter are generally higher. Table 10, compiled from records of the United States Weather Bureau station at Brunswick, in nearby Glynn County, gives monthly and annual temperatures and precipitation believed to be typical of those in McIntosh County.

<sup>3</sup> Statistics used are from reports published by the U.S. Bureau of the Census.

In summer, temperatures during the day average 81.6 degrees, but temperatures of 90 degrees or higher are often recorded. Thunderstorms often cool the air in the afternoon. Generally, temperatures at night drop to the low eighties, but they sometimes fall below seventy. The temperatures in McIntosh County are seldom extremely low. During the period between 1925 and 1954, temperatures have been lower than 20 degrees only four times, but a reading of 13 degrees was recorded in Brunswick in 1895.

Light freezes may be expected each year. Cold spells do not last long, and temperatures of freezing or below that last for more than 3 consecutive days are infrequent. Even in the coldest weather, temperatures are relatively high during the day; they always rise above the freezing mark.

TABLE 10.—*Temperature and precipitation at Brunswick, Glynn County, Georgia*

[Elevation, 14 feet]

Month	Temperature <sup>1</sup>			Precipitation <sup>2</sup>			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1931)	Wettest year (1953)	Average snowfall
December.....	55.3	84	19	2.98	2.89	5.44	
January.....	54.1	83	17	2.88	2.59	1.67	( <sup>3</sup> )
February.....	55.7	86	13	2.83	1.73	3.93	0.1
Winter.....							
March.....	61.3	99	24	3.21	4.05	3.43	0
April.....	67.8	94	35	3.08	1.56	6.09	( <sup>3</sup> )
May.....	74.6	100	44	3.28	.35	.77	( <sup>3</sup> )
Spring.....							
June.....	80.9	104	57	5.54	2.77	3.68	0
July.....	82.0	104	63	7.44	5.28	11.75	0
August.....	81.9	103	63	6.57	6.26	16.37	0
Summer.....							
September.....	78.6	101	51	7.10	3.06	22.86	0
October.....	70.5	95	38	3.73	.28	1.61	0
November.....	61.0	89	21	1.72	1.10	1.55	0
Fall.....							
Year.....	68.6	104	13	50.36	31.92	79.15	0.1

<sup>1</sup> Average temperature based on a 40-year record, through 1955; highest and lowest temperatures on a 50-year record, through 1952.

<sup>2</sup> Average precipitation based on a 55-year record, through 1955; wettest and driest years based on a 55-year record, in the period 1879-1955; snowfall based on a 44-year record, through 1952.

<sup>3</sup> Trace.

The average length of the growing season in McIntosh County is from 280 to 290 days (2). The growing season at nearby Brunswick is 293 days. The average date of the last freezing temperature in spring at Brunswick is February 17, and the average date of the first freezing temperature in fall is December 5. There is the possibility of

a light freeze as early as December 10 and as late as March 20. Freezing has occurred as early as November 3 and as late as March 27.

The average annual precipitation recorded at Brunswick is 50.36 inches. Afternoon thundershowers during the months of June through September produce about 53 percent of the annual precipitation. Only about 20 percent of the annual precipitation falls during the period November through February. Monthly extremes of rainfall have ranged from 0.28 inch in October 1931 to 22.86 inches in September 1953. Most of the large amounts of rainfall that have fallen in any one day or in any one month have resulted from tropical storms. A number of these storms have passed near enough to cause heavy rains and damage from wind, but hurricanes of major consequence are rare. Little snow falls in the area.

Early in the morning, humidity averages about 90 percent. Afternoon readings show an average of about 55 percent.

Occasionally, there is a dry season. In 5 out of 10 years, 50 days of drought can be expected (15). The seasonal distribution of rainfall shows that deficiencies in moisture are most likely to occur in March, but at times there are dry periods in April. The probability of a deficiency in moisture in the months of May through October is high. The number of drought days is greatest in May and fewest in July and August. The number increases in September and October.

## Water Supplies

An artesian aquifer underlies McIntosh County. At Darien, the aquifer is at a depth of about 600 feet. Three limestone formations compose this aquifer and act as a single hydrologic unit (11). Above and below the limestone are beds of clay through which water infiltrates slowly. The clay above the limestone is of Miocene age, and that below is of Eocene age. The clay confines water within the limestone.

Wells are usually drilled into the limestone and are cased to a depth slightly below the top of the limestone. Casings are driven or cemented into place, and the rest of the hole in the limestone is uncased. These wells have yields of water that range from about 100 to 4,000 gallons per minute. The yield depends upon the diameter of the well and the depth to which it is driven. The water is of good quality. It is low in silica, iron, and dissolved solids, and hardness is as much as 120 parts per million. Most of the water has traces of sulfate in it, and this gives the water a distinctive odor and taste.

Many farms are supplied with water from wells drilled into sand, which is at a shallower depth than the limestone. Most of these wells are 30 to 70 feet deep and yield moderate amounts of water. The water is softer than water taken from limestone and is more suitable for domestic use.

Artesian pressure has declined within the county during the past 20 years. Much water is wasted from wells that are allowed to flow continuously. Increased use of water for municipal, industrial, domestic, and irrigation purposes has also caused the water levels to decline in the coastal area. Figure 6, in the section "Formation, Classification, and Morphology of Soils" illustrates the height of pressure in the aquifer in 1957 (10).

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## Glossary

**Acidity, soil.** The degree of acidity or alkalinity of a soil mass is expressed in pH values, or in words, as follows:

	pH		pH
Extremely acid.	Below 4.5	Mildly alkaline.	7.4-7.8
Very strongly acid.	4.5-5.0	Moderately alkaline.	7.9-8.4
Strongly acid.	5.1-5.5	Strongly alkaline.	8.5-9.0
Medium acid.	5.6-6.0	Very strongly alkaline.	9.1 and higher
Slightly acid.	6.1-6.5		
Neutral.	6.6-7.3		

**Alluvium** (alluvial deposits). Soil materials deposited on land by streams.



- Aquifer.** A porous soil or geological formation that yields ground water to wells and springs.
- Bay.** A depressed, swampy area in which water-tolerant plants grow. Shallow water covers the surface intermittently.
- Clay.** (1) As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. (2) As a soil textural class, soil material that contains 40 percent or more clay, as defined under (1), less than 45 percent sand, and less than 40 percent silt. (See also Texture, soil.)
- Concretion.** Hard grains, pellets, or nodules from concentrations of compounds in the soil that cement the soil grains together. The concretions contain calcium, iron, or manganese.
- Consistence, soil.** The nature of soil material that is expressed by the resistance of the individual particles to separating from one another (cohesion) or by the ability of the soil mass to undergo a change in shape without breaking (plasticity). The consistence varies with the moisture content. Thus, a soil aggregate or clod may be hard when dry and plastic when wet. Terms used to describe consistence are—
- Friable.* When moist, easily crushed by hand and coheres when pressed together. Friable soils are easily tilled.
- Firm.* When moist, crushes under moderate pressure but resistance is distinctly noticeable. Firm soils are likely to be difficult to till.
- Hard.* When dry, is moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and forefinger.
- Indurated.* Hard, very strongly cemented; brittle; does not soften under prolonged wetting.
- Loose.* Noncoherent when moist or dry. Loose soils are generally coarse textured and are easily tilled.
- Plastic.* When wet, retains an impressed shape and resists being deformed; plastic soils are high in clay and are difficult to till.
- Soft.* Weakly coherent and fragile; when dry, breaks to powder or individual grains under slight pressure.
- First bottom.** The normal flood plain of a stream. Some first bottom areas are flooded frequently, others at less frequent intervals. The term "high bottom phase" is commonly applied to areas that are rarely flooded. See also Flood plain.
- Flood plain.** Nearly level land occupying the bottom of the valley of a present stream and subject to flooding unless protected artificially.
- Friable.** See Consistence, soil.
- Genesis, soil.** Mode of origin of the soil. Soil genesis refers particularly to the processes causing the development of the solum from unconsolidated parent materials.
- Humus.** Organic matter that has reached a more or less stable, advanced stage of decomposition; the plant and animal residues in the soil that have undergone some appreciable degree of decomposition.
- Loam soil.** Soil having approximately equal amounts of sand, silt and clay.
- Morphology, soil.** The physical constitution of the soil including the texture, structure, consistence, color, and other physical and chemical properties of the various soil horizons that make up the soil profile.
- Mottled (or mottling).** Irregularly marked with spots of color and generally associated with poor drainage. Descriptive terms for mottles follow: Contrast—*faint, distinct, and prominent*; abundance—*few, common, and many*; and size—*fine, medium, and coarse*. The size measurements are as follows: Fine, commonly less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; medium, commonly ranging between 5 and 15 millimeters (about 0.2 to 0.6 inch) along the greatest dimension; and coarse, commonly more than 15 millimeters (about 0.6 inch) along the greatest dimension.
- Permeability, soil.** That quality of the soil that enables it to transmit air and water. Moderately permeable soils transmit air and water readily. Such conditions are favorable for the growth of roots. Slowly permeable soils allow water and air to move so slowly that the growth of roots may be restricted. Rapidly permeable soils transmit air and water rapidly, and roots make good growth.
- Piezometric surface.** An imaginary surface that coincides with the point to which water will rise in the tight casing of a well that penetrates a body of confined ground water.
- Pocosin.** A local name given by the Indians to a swamp that contains more or less peat.
- Reaction.** See Acidity, soil.
- Relief.** The elevations or inequalities of the land surface, considered collectively.
- Sand.** (1) Individual rock or mineral fragments having diameters ranging from 0.05 millimeter to 2.0 millimeters. Sand grains consist chiefly of quartz, but they may be of any mineral composition. (2) The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay. See also Texture, soil.
- Silt.** (1) Individual-mineral particles of soil that range in diameter between the upper size of clay, 0.002 millimeter, and the lower size of very fine sand, 0.05 millimeter. (2) Soil of the textural class called silt contains 80 percent or more of silt and less than 12 percent of clay. (3) Sediments deposited from water in which the individual grains are approximately of the size of silt, although the term is sometimes applied loosely to sediments containing considerable sand and clay. (See also Texture, soil.)
- Soil.** The natural medium for the growth of land plants. A soil is a natural, three-dimensional body on the surface of the earth, unlike the adjoining bodies.
- Soil separates.** The individual size groups of soil particles, as sand, silt, and clay.
- Solum.** The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material. The living roots and other plant and animal life characteristic of the soils are largely confined to the solum.
- Structure, soil.** The aggregation of primary soil particles into compound particles, or clusters of primary particles, which are separated from adjoining aggregates by surfaces of weakness. Soil structure is classified according to grade, class, and type.
- Grade:** Distinctness of aggregation. It expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: Structureless (single grain or massive), weak, moderate, and strong.
- Class:** Size of soil aggregates. Terms: Very fine or very thin, fine or thin, medium, coarse or thick, and very coarse or very thick.
- Type:** Shape and arrangement of individual natural soil aggregates. Terms: Platy, prismatic, columnar, (angular) blocky, subangular blocky, granular, and crumb. (Example of soil-structure grade, class, and type: Moderate, coarse, subangular blocky.)
- Subsoil.** Technically, the B horizon of soils with distinct profiles; roughly, that part of the profile below plow depth.
- Substratum.** Any layer lying beneath the solum, or true soil.
- Terrace (geological).** An old alluvial plain, usually flat or undulating, bordering a stream; frequently called second bottoms as contrasted with flood plains; seldom subject to overflow.
- Terrace, marine.** A level or nearly level plain once covered by the sea.
- Texture, soil.** The relative proportions of the various size groups of individual soil grains in a mass of soil; specifically, the proportions of sand, silt, and clay. The soil textural classes, in increasing order of the content of the finer separates, are as follows: *Sand, loamy sand, sandy loam, loam, silt loam, and clay*. These classes may be modified according to relative size of the coarser particles; for example, *fine sand, loamy fine sand, fine sandy loam, very fine sandy loam, coarse sandy loam, gravelly sandy loam, gravelly loam, cobbly loam, sandy clay, stony clay, and stony loam*.
- Tilth, soil.** The condition of the soil in its relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.
- Understory.** A layer of foliage in a forest below the level of the main canopy; also, the trees forming such a layer.

GUIDE TO MAPPING UNITS<sup>1</sup>

Map symbol	Mapping unit	Page	Capability unit	Page	Woodland group	Page	Range site
BhA	Bayboro clay loam.....	5	IIIw-2	30	4	40	Bladen Flatwoods.
BjA	Bladen loam and clay loam.....	6	Vw-1	32	4	40	Bladen Flatwoods.
BkA	Bladen-Coxville fine sandy loams.....	7	IIIw-2	30	6	41	Bladen Flatwoods.
BnB	Blanton fine sand, 0 to 5 percent slopes.....	7	IVw-3	31	3	39	Sandy Flatwoods.
Cub	Coastal beach.....	8	VIIIIs-1	34	( <sup>3</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
DmA	Dunbar fine sandy loam, 0 to 2 percent slopes.....	8	IIw-3	29	2	39	Bladen Flatwoods.
Dsl	Dune land.....	9	VIIIIs-1	34	( <sup>3</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
EoA	Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes.....	9	IIE-3	29	1	37	Bladen Flatwoods.
EpA	Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes.....	10	IIE-3	29	1	37	Bladen Flatwoods.
EpB	Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes.....	10	IIE-3	29	1	37	Bladen Flatwoods.
FpB	Fairhope fine sandy loam, 2 to 5 percent slopes.....	10	IIE-3	29	1	37	Bladen Flatwoods.
GrA	Galestown fine sand, 0 to 2 percent slopes.....	11	IIIIs-2	31	5	41	Coastal Hammock.
KfA	Klej fine sand, 0 to 2 percent slopes.....	12	IVw-3	31	3	39	Sandy Flatwoods.
LwB	Lakeland coarse sand, deep, 2 to 5 percent slopes.....	13	VIIIs-1	34	9	42	Scrub Oak Sand Ridge.
LwC	Lakeland coarse sand, deep, 5 to 12 percent slopes.....	13	VIIIs-1	34	9	42	Scrub Oak Sand Ridge.
LpA	Lakeland sand, 0 to 2 percent slopes.....	12	IIIIs-2	31	5	41	Coastal Hammock.
LpC	Lakeland sand, 5 to 8 percent slopes.....	12	IVIs-1	32	5	41	Coastal Hammock.
LxC	Lakewood coarse sand, thick surface, 5 to 8 percent slopes.....	13	VIIIs-1	34	9	42	Scrub Oak Sand Ridge.
LrA	Leon fine sand.....	14	Vw-4	33	7	41	Hardpan Flatwoods.
LuA	Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes.....	14	IIw-2	29	2	39	Bladen Flatwoods.
Mae	Made land.....	15	VIIw-3	33	( <sup>3</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
MBA	Meggett loam.....	15	IIIw-2	30	4	40	Bladen Flatwoods.
ObA	Ona fine sand.....	16	IIIw-1	30	3	39	Sandy Flatwoods.
OsA	Ona and Scranton fine sands, alkaline variants.....	16	IIIw-1	30	3	39	Sandy Flatwoods.
PdA	Palm Beach fine sand, dark.....	17	IIIIs-2	31	5	41	Coastal Hammock.
PeA	Plummer sands.....	17	Vw-2	32	8	42	Pine-Hardwood Lowlands.
Por	Portsmouth loam.....	18	IIIw-2	30	4	40	Bladen Flatwoods.
RkA	Rutlege fine sand.....	18	Vw-2	32	8	42	Pine-Hardwood Lowlands.
Stj	St. Johns fine sand.....	19	Vw-2	32	8	42	Pine-Hardwood Lowlands.
Swa	Swamp.....	19	VIIw-1	33	10	42	Swamp.
Tmh	Tidal marsh, high.....	20	VIIw-3	33	( <sup>3</sup> )	( <sup>3</sup> )	Salt Marsh.
Tml	Tidal marsh, low.....	19	VIIw-3	33	( <sup>3</sup> )	( <sup>3</sup> )	Salt Marsh.
Wes	Weston loamy fine sand.....	21	IIIw-2	30	6	41	Bladen Flatwoods.
Wst	Weston loamy sand, thick surface.....	20	IIIw-2	30	8	42	Bladen Flatwoods.
Wet	Weston very coarse sand.....	21	Vw-2	32	8	42	Bladen Flatwoods.
Wtl	Wet alluvial land.....	21	IVw-1	31	10	42	Fresh Marsh.

<sup>1</sup> Table 1, p. 6, shows the acreage and proportionate extent of the soils; tables 3, p. 35, gives estimated yields of crops; and table 6, p. 44, lists the nine important range sites and gives important features of each. For information about the engineering properties

of the soils see the section "Engineering Uses of Soils" beginning on p. 46.

<sup>2</sup> Not used extensively for range.

<sup>3</sup> Not suitable for growing trees.

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GENERAL SOIL MAP

SOIL LEGEND

The first letter in each symbol is the initial of the soil series name. If the third letter is a capital, it denotes the range of slope, from A, less than 2 percent, to C, 5 to 12 percent. Symbols that do not contain a slope letter are for nearly level soils, with the exception of Cub, Coastal beach, and Dsl, Dune land.

SYMBOL	NAME
BhA	Bayboro clay loam
BJA	Bladen loam and clay loam
BkA	Bladen-Coxville fine sandy loams
BnB	Blanton fine sand, 0 to 5 percent slopes
Cub	Coastal beach
DmA	Dunbar fine sandy loam, 0 to 2 percent slopes
Dsl	Dune land
EoA	Eulonia-Fairhope fine sandy loams, 0 to 2 percent slopes
EpA	Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes
EpB	Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes
FpB	Fairhope fine sandy loam, 2 to 5 percent slopes
GrA	Galestown fine sand, 0 to 2 percent slopes
KfA	Klej fine sand, 0 to 2 percent slopes
LwB	Lakeland coarse sand, deep, 2 to 5 percent slopes
LwC	Lakeland coarse sand, deep, 5 to 12 percent slopes
LpA	Lakeland sand, 0 to 2 percent slopes
LpC	Lakeland sand, 5 to 8 percent slopes
LxC	Lakewood coarse sand, thick surface, 5 to 8 percent slopes
LrA	Leon fine sand
LuA	Lynchburg loamy fine sand, thick surface, clayey substratum, 0 to 2 percent slopes
Mae	Made land
MBA	Meggett loam
ObA	Ona fine sand
OsA	Ona and Scranton fine sands, alkaline variants
PdA	Palm Beach fine sand, dark
PeA	Plummer sands
Por	Portsmouth loam
RkA	Rutlege fine sand
Stj	St. Johns fine sand
SwA	Swamp
Tmh	Tidal marsh, high
Tml	Tidal marsh, low
Wes	Weston loamy fine sand
Wst	Weston loamy sand, thick surface
Wet	Weston very coarse sand
Wtl	Wet alluvial land

SOIL ASSOCIATIONS

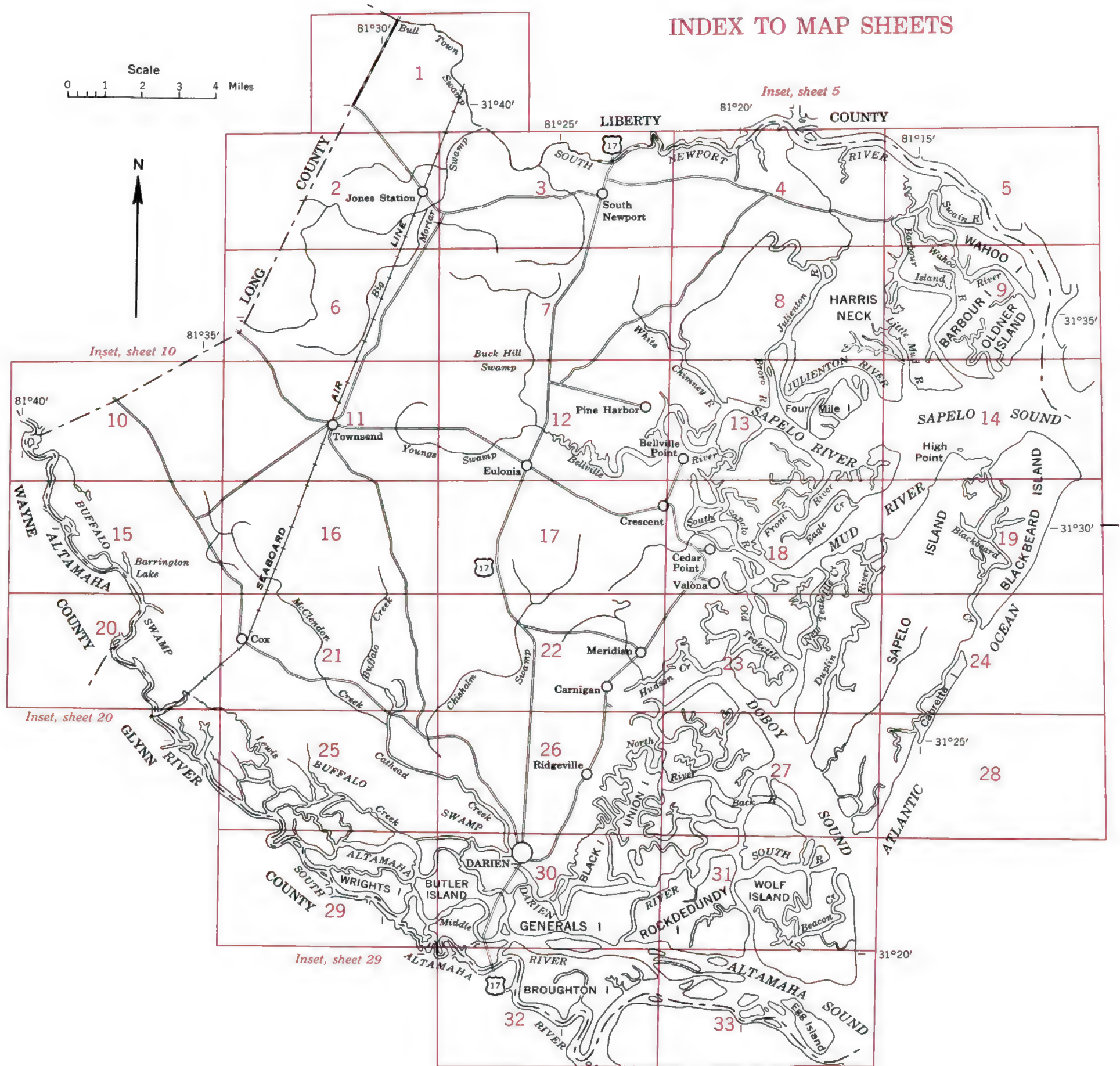
- 1 Frequently flooded alluvial soils along the eastern seaboard and along large rivers: Tidal marsh, Swamp, Wet alluvial land
- 2 Poorly drained and very poorly drained soils on broad, depressed flats and in bays: Weston, Bayboro, Bladen-Coxville
- 3 Somewhat poorly drained to very poorly drained soils on broad, nearly level uplands and in bays: Leon, Rutlege
- 4 Excessively drained to somewhat poorly drained sands on low ridges and bluffs: Galestown, Klej, Ona
- 5 Moderately well drained, level to very gently sloping soils on low ridges and knolls, and poorly drained soils on slightly depressed flats: Eulonia-Fairhope, Bladen-Coxville
- 6 Excessively drained sands on high ridges adjacent to and within the Altamaha River swamp: Lakeland, Lakewood

Soil map constructed 1960 by Cartographic Division, Soil Conservation Service, USDA, from 1953 aerial photographs. Controlled mosaic based on Georgia plane coordinate system, east zone, Transverse Mercator projection, 1927 North American datum.



# McINTOSH COUNTY, GEORGIA

## INDEX TO MAP SHEETS



SOIL LEGEND

The first letter in each symbol is the initial of the soil series name. If the third letter is a capital, it denotes the range of slope, from A, less than 2 percent, to C, 5 to 12 percent. Symbols that do not contain a slope letter are for nearly level soils, with the exception of Cub, Coastal beach, and Dsl, Dune land.

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EpA	Eulonia-Fairhope loamy fine sands, thick surfaces, 0 to 2 percent slopes
EpB	Eulonia-Fairhope loamy fine sands, thick surfaces, 2 to 5 percent slopes
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GrA	Galestown fine sand, 0 to 2 percent slopes
KfA	Kleij fine sand, 0 to 2 percent slopes
LwB	Lakeland coarse sand, deep, 2 to 5 percent slopes
LwC	Lakeland coarse sand, deep, 5 to 12 percent slopes
LpA	Lakeland sand, 0 to 2 percent slopes
LpC	Lakeland sand, 5 to 8 percent slopes
LxC	Lakewood coarse sand, thick surface, 5 to 8 percent slopes
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Wes	Weston loamy fine sand
Wst	Weston loamy sand, thick surface
Wet	Weston very coarse sand
Wtl	Wet alluvial land



# CONVENTIONAL SIGNS

## WORKS AND STRUCTURES

### Highways and roads

Dual .....	
Good motor .....	
Poor motor .....	
Trail .....	

### Highway markers

National Interstate .....	
U. S. ....	
State .....	

### Railroads

Single track .....	
Multiple track .....	
Abandoned .....	

### Bridges and crossings

Road .....	
Trail, foot .....	
Railroad .....	
Ferries .....	
Ford .....	
Grade .....	
R. R. over .....	
R. R. under .....	
Tunnel .....	

### Buildings

School .....	
Church .....	
Station .....	

### Mines and Quarries

Mine dump .....	
Pits, gravel or other .....	

### Power lines

Pipe lines .....	
------------------	--

### Cemeteries

Dams .....	
------------	--

### Levees

Tanks .....	
-------------	--

### Sawmill

Forest fire lookout station .....	
-----------------------------------	--

### Canal locks (point upstream)

--

## BOUNDARIES

National or state .....	
County .....	
Township, U. S. ....	
Section line, corner .....	
Reservation .....	
Land grant .....	
Township, civil .....	

## DRAINAGE

### Streams

Perennial .....	
Intermittent, unclass. ....	

### Canals and ditches


### Lakes and ponds

Perennial .....	
Intermittent .....	

### Wells

	flowing
--	---------

### Springs

--

### Marsh

--

### Wet spot

--

## RELIEF

### Escarpments

Bedrock .....	
Other .....	

### Prominent peaks

--

### Depressions

	Large	Small
Crossable with tillage implements .....		
Not crossable with tillage implements .....		
Contains water most of the time .....		

## SOIL SURVEY DATA

### Soil boundary

and symbol .....



Gravel .....



Stones .....



Rock outcrops .....



Chert fragments .....



Clay spot .....



Sand spot .....



Gumbo or scabby spot .....



Made land .....



Severely eroded spot .....



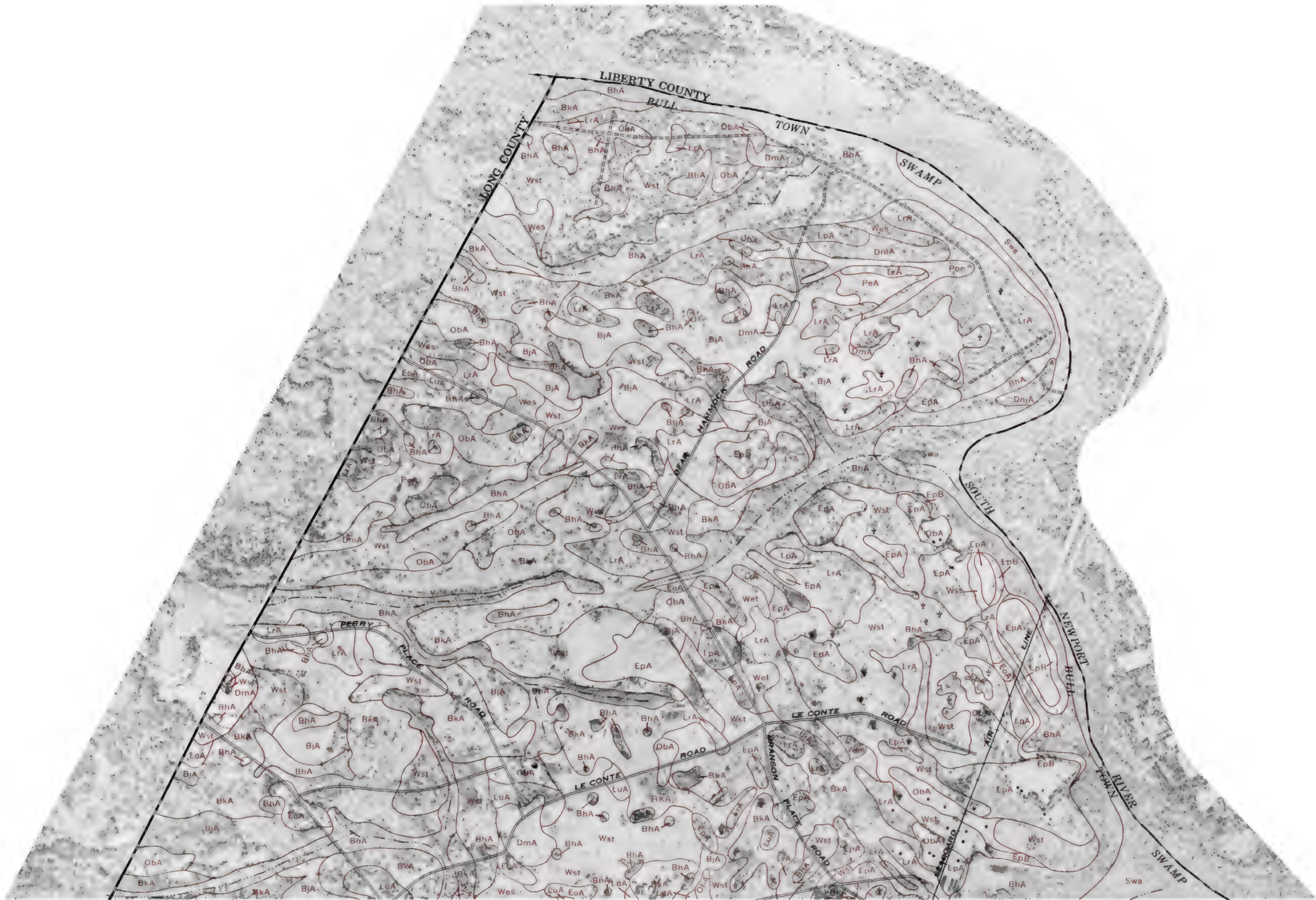
Blowout, wind erosion .....



Gullies .....



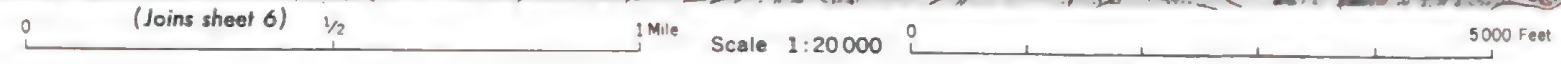
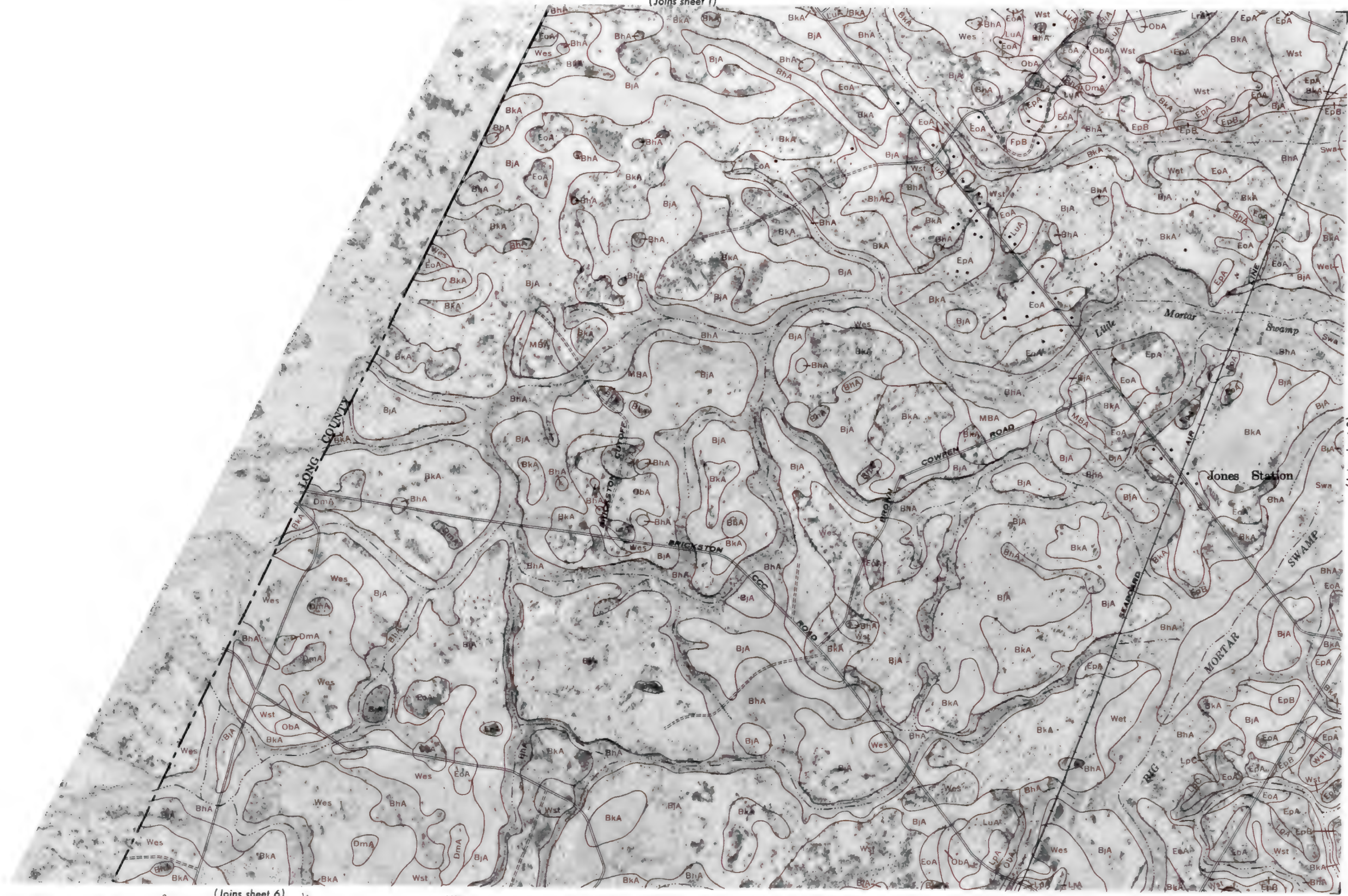




0 1/2 1 Mile Scale 1:20000 0 5000 Feet (Joins sheet 2) | (Joins sheet 3)

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.





(Joins sheet 6)

(Joins sheet 3)



(Joins sheet 1)



(Joins sheet 2)

(Joins sheet 4)

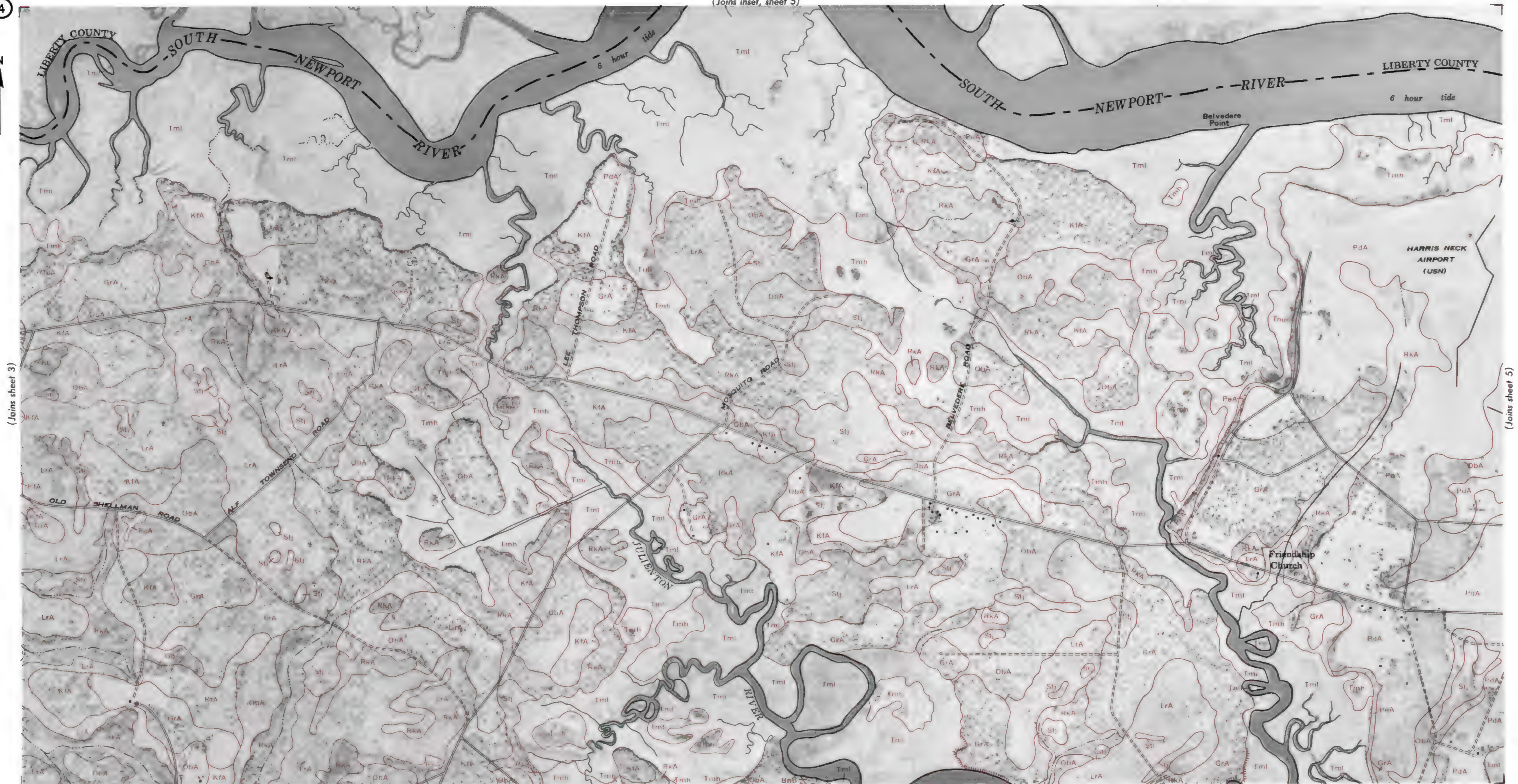
This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.



(Joins sheet 7)



4



(Joins sheet 3)

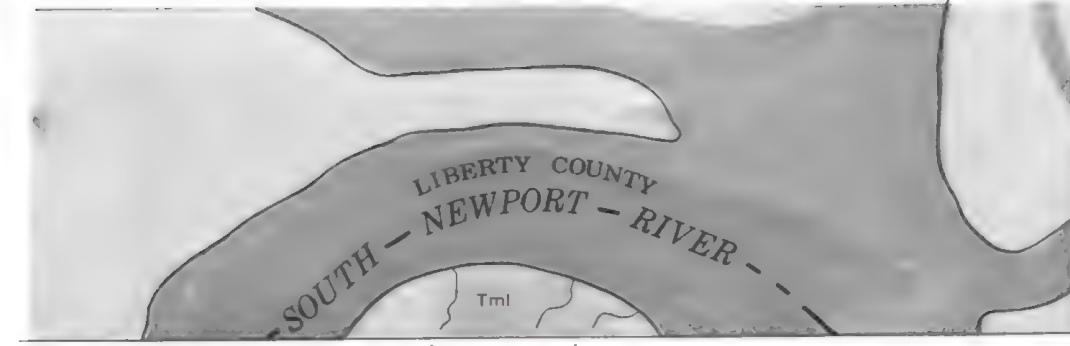
(Joins sheet 5)

(Joins sheet 8)

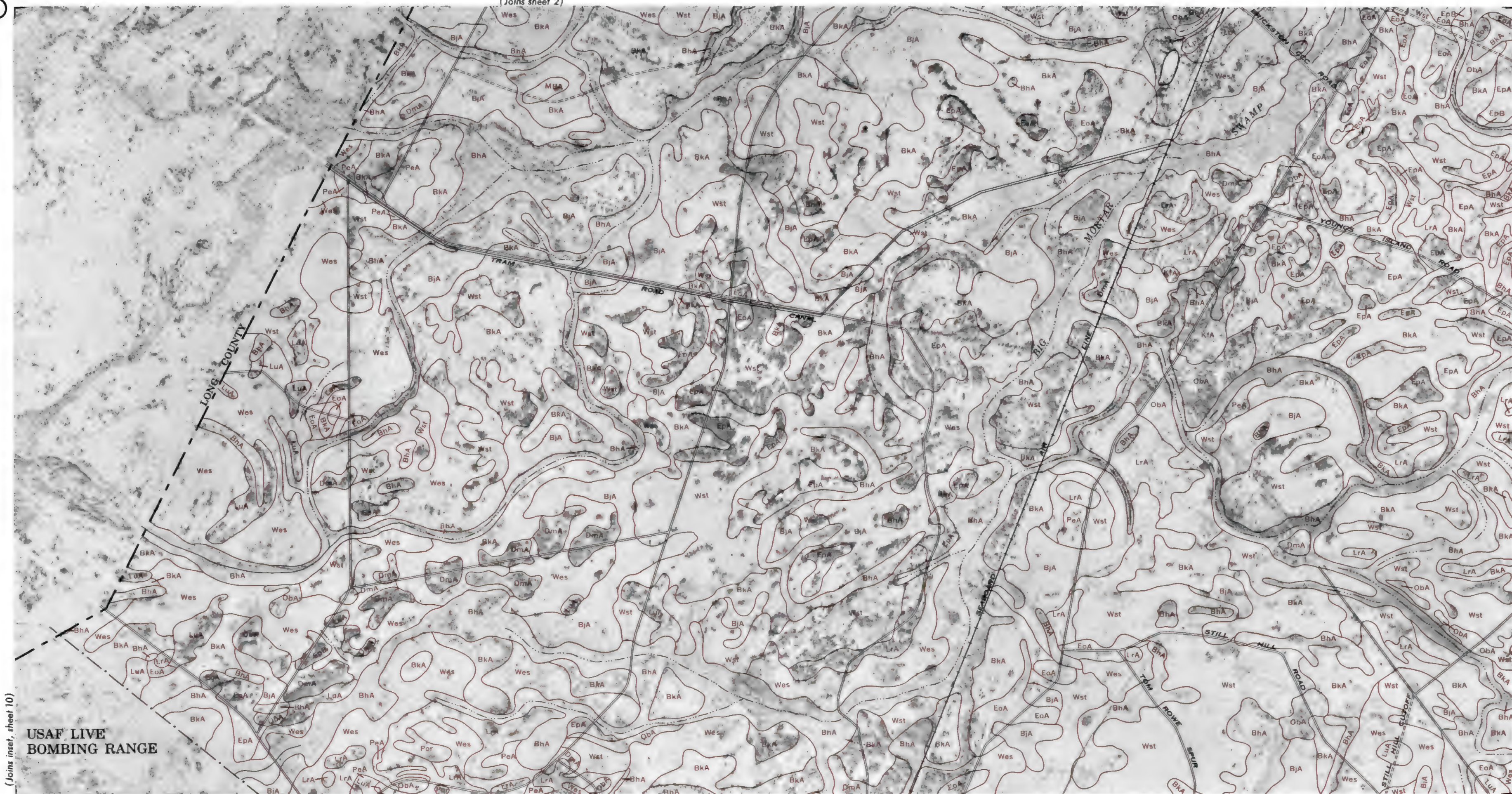
0 1/2 1 Mile Scale 1:20 000 0 5000 Feet



This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.







## USAF LIVE BOMBING RANGE

(Joins sheet 11)

1st





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(Joins sheet 6)



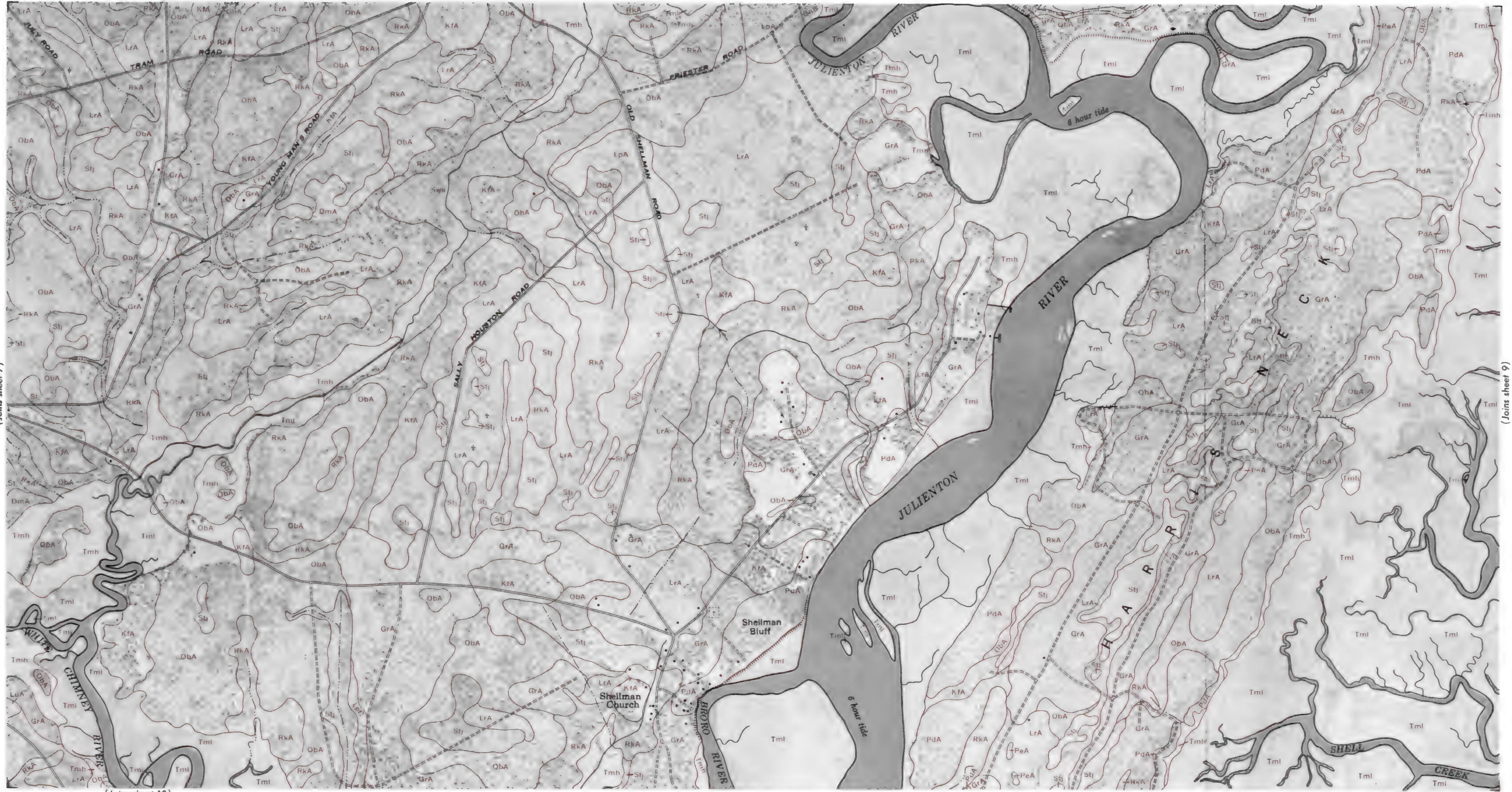
(Joins sheet 8)



(Joins sheet 4)



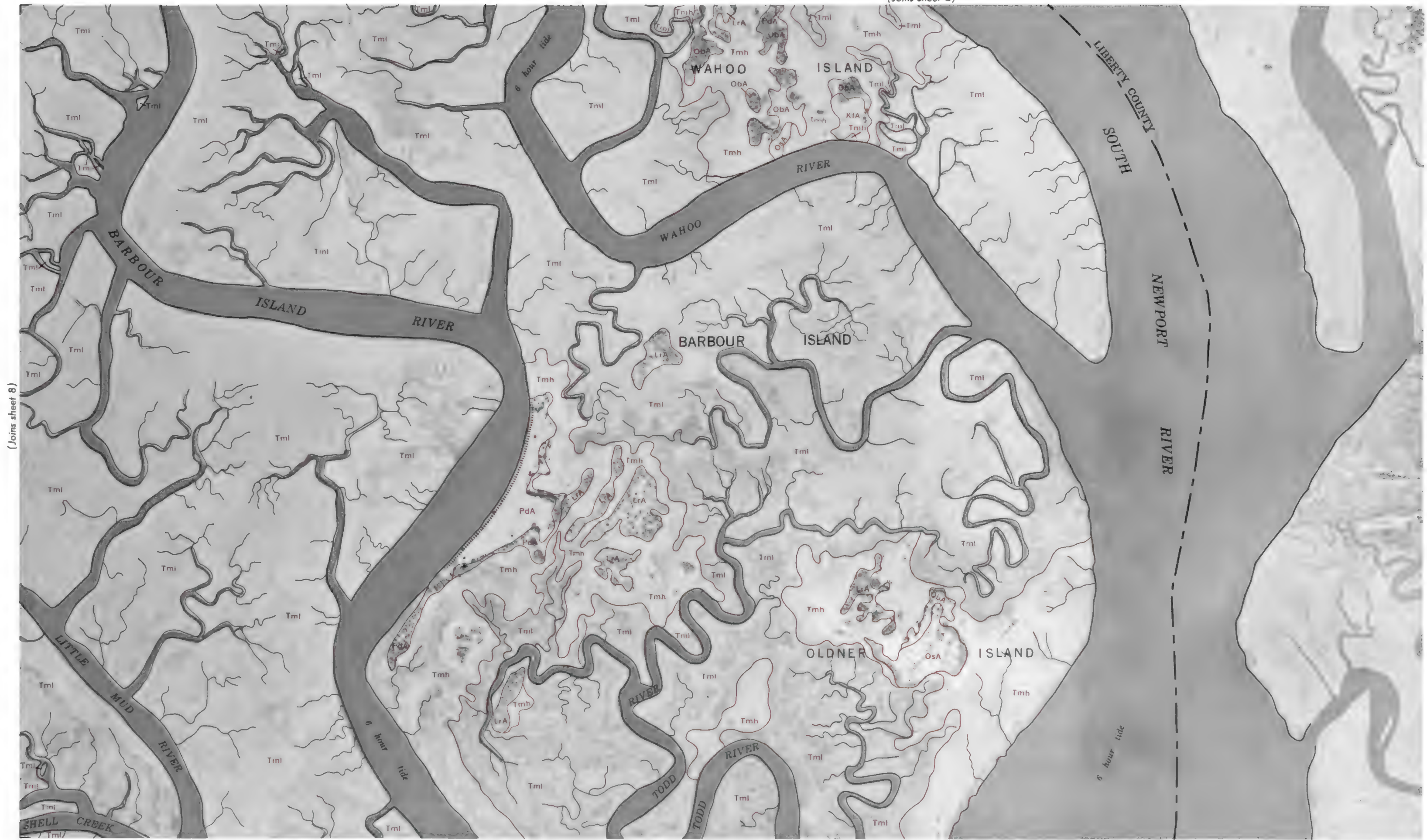
(Joins sheet 7)



(Joins sheet 13)

(Joins sheet 9)





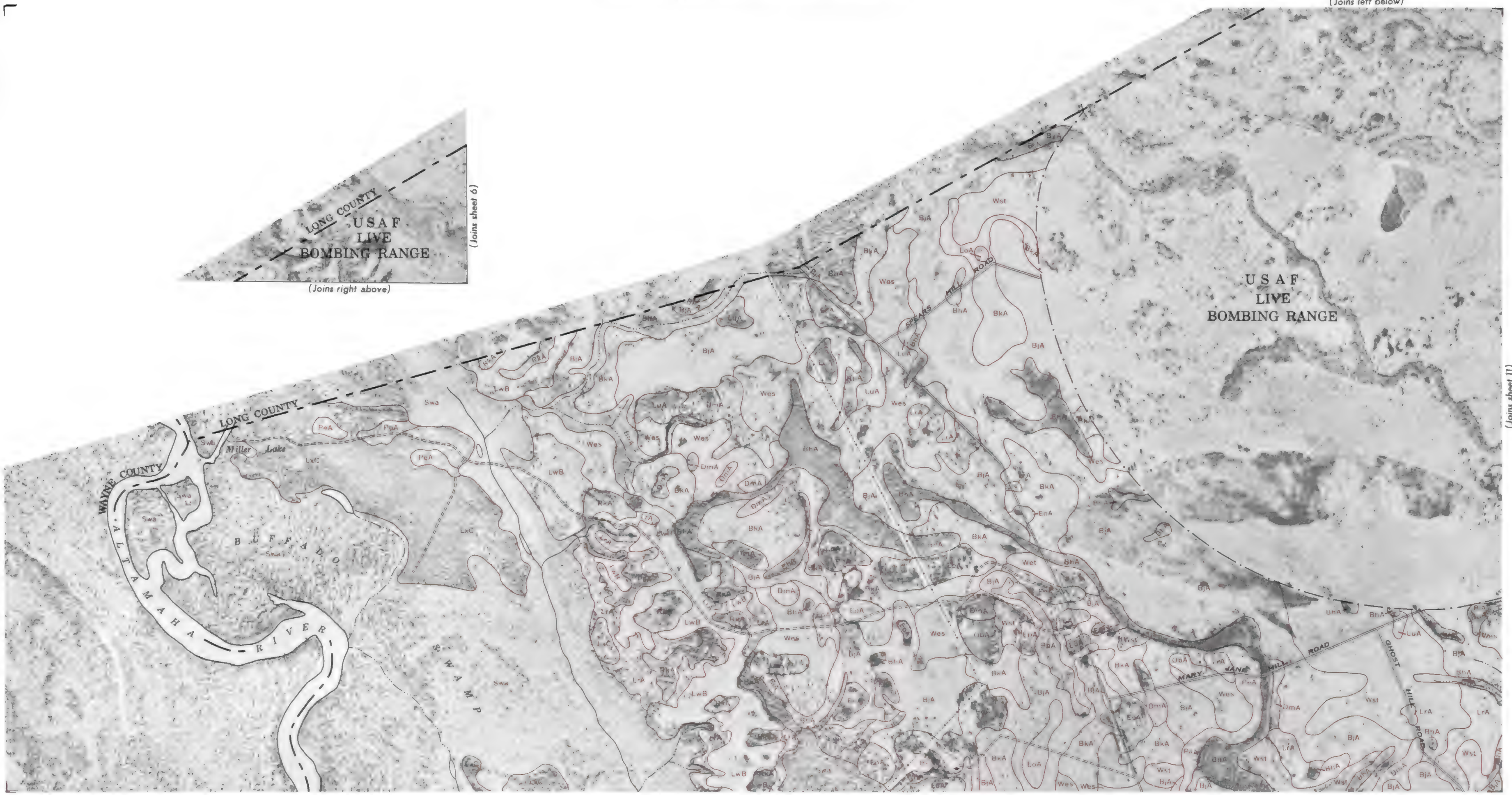
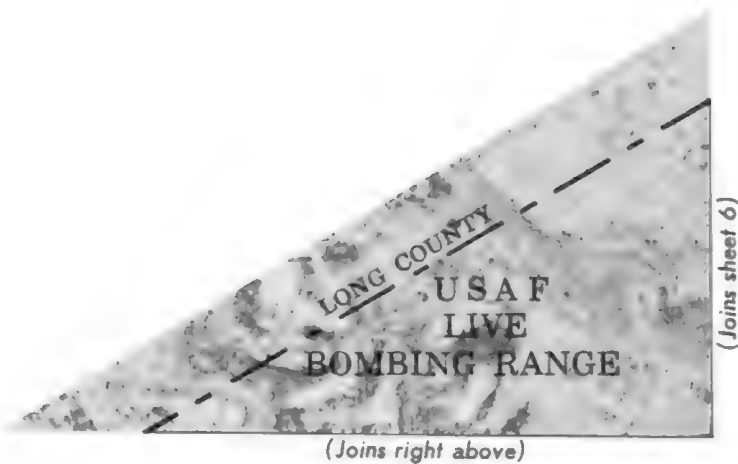
(Joins sheet 8)

(Joins sheet 14)



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(Joins sheet 10)

USAF  
LIVE BOMBING RANGE

Townsend

JACKIE CAMP

YOUNGS

SWAMP

(Joins sheet 12)

0 1/2 1 Mile Scale 1:20000 0 5000 Feet

(Joins sheet 16)



(Joins sheet 7)



(Joins sheet 11)



(Joins sheet 13)

(Joins sheet 17)

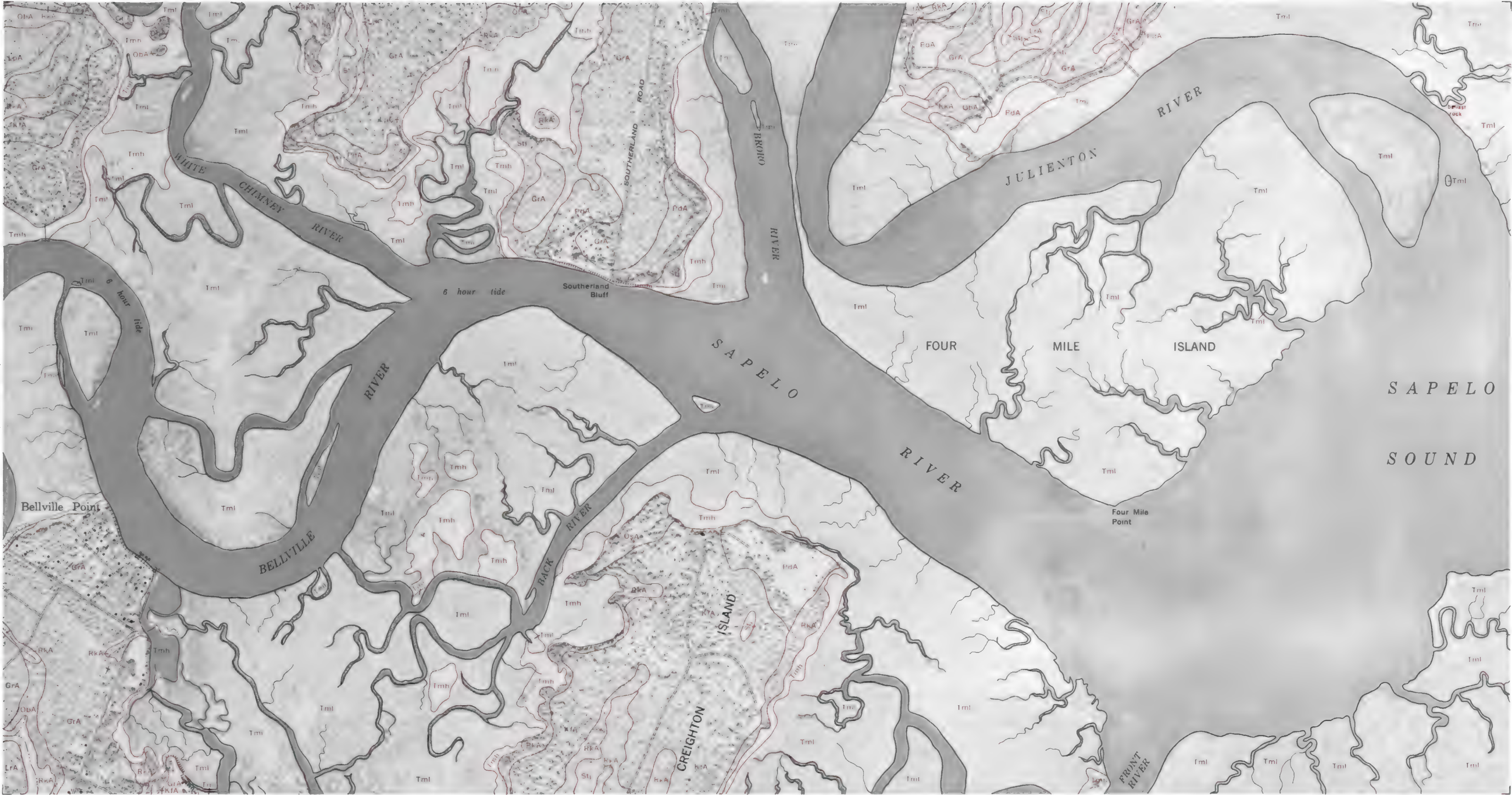






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(Joins sheet 12)



(Joins sheet 14)



(Joins sheet 9)



(Joins sheet 13)



6 hour tide

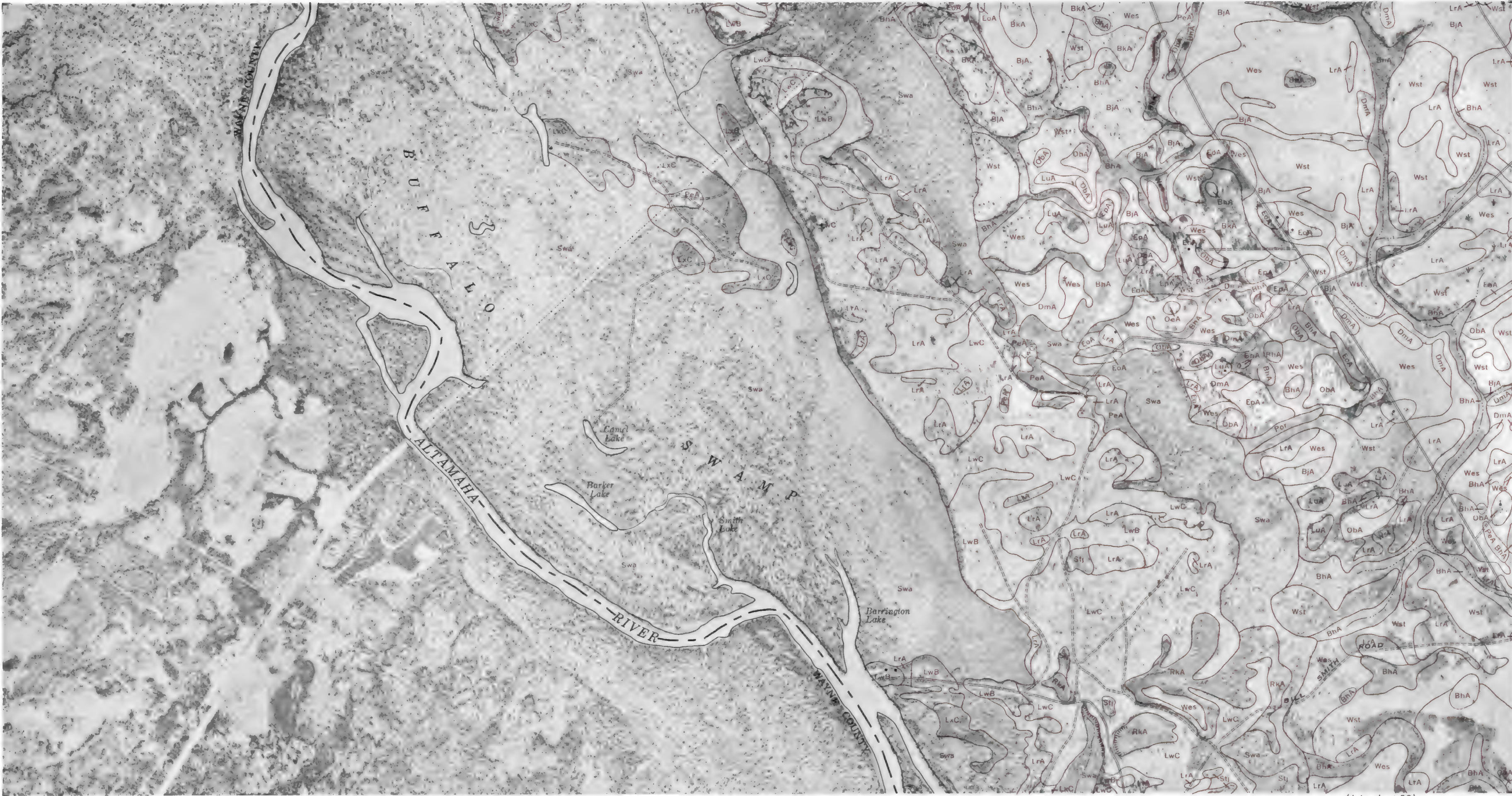
(Joins sheet 19)

0 1/2 1 Mile Scale 1:20 000 0 5000 Feet



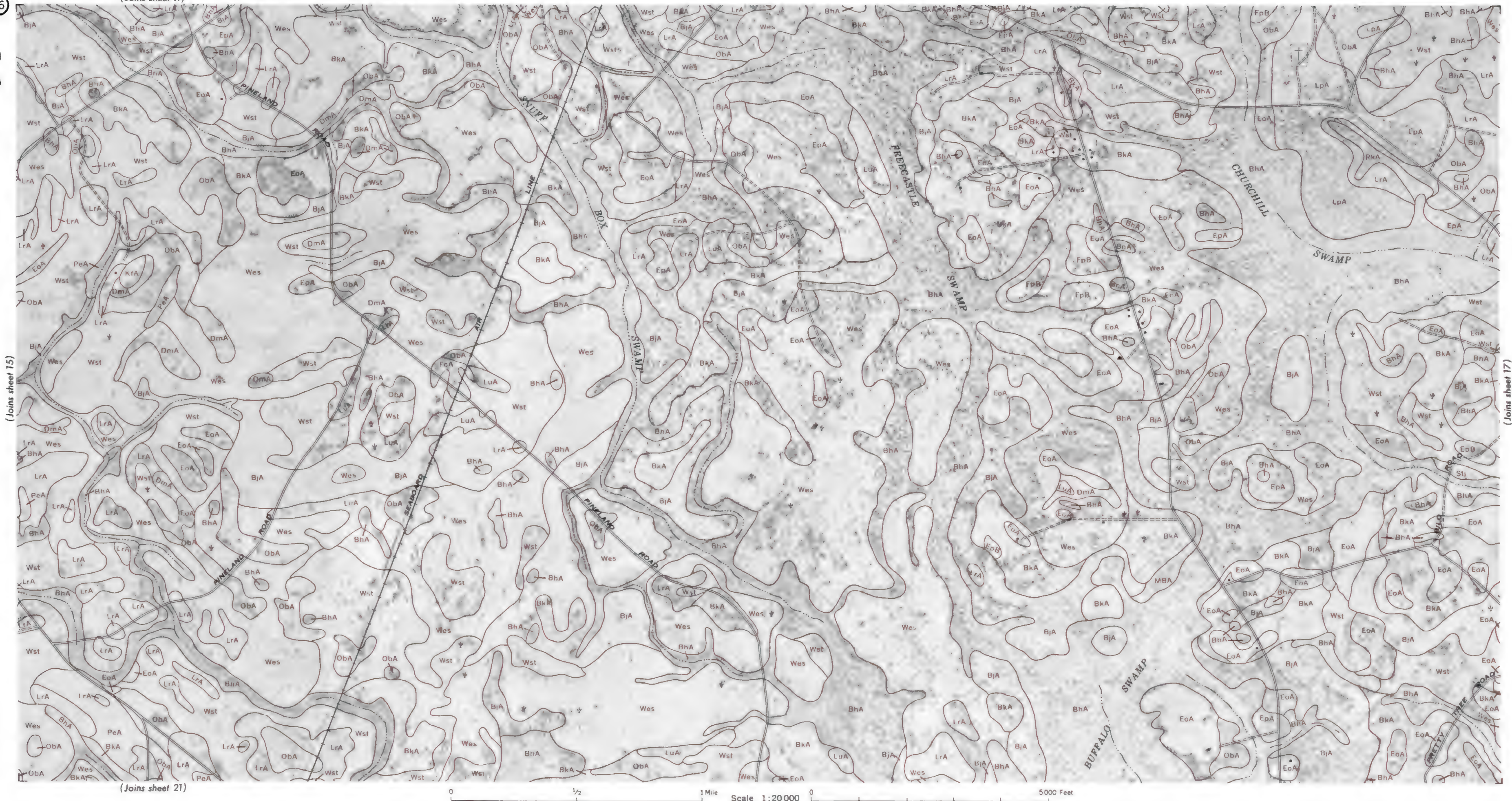


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(Joins sheet 16)

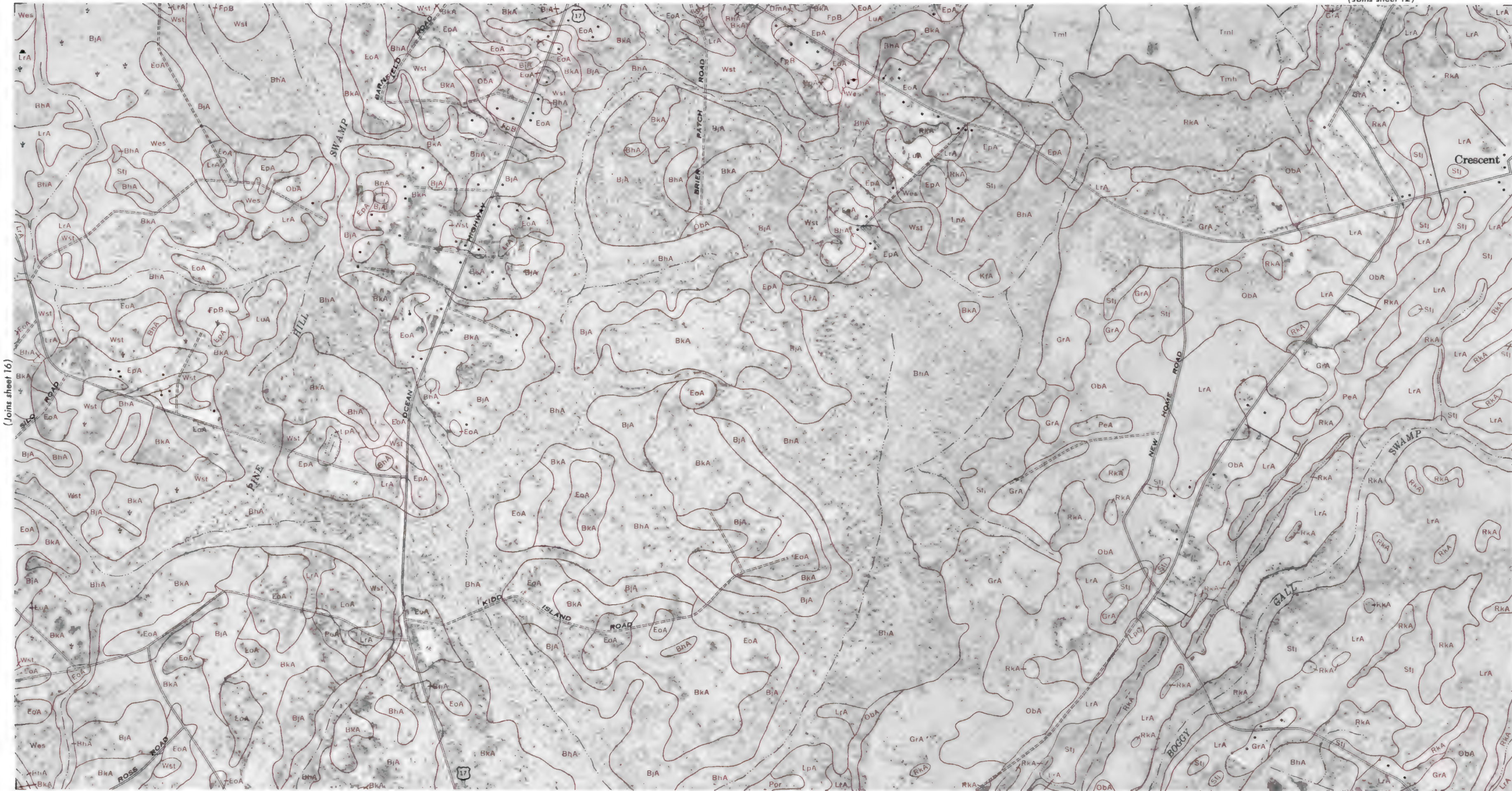








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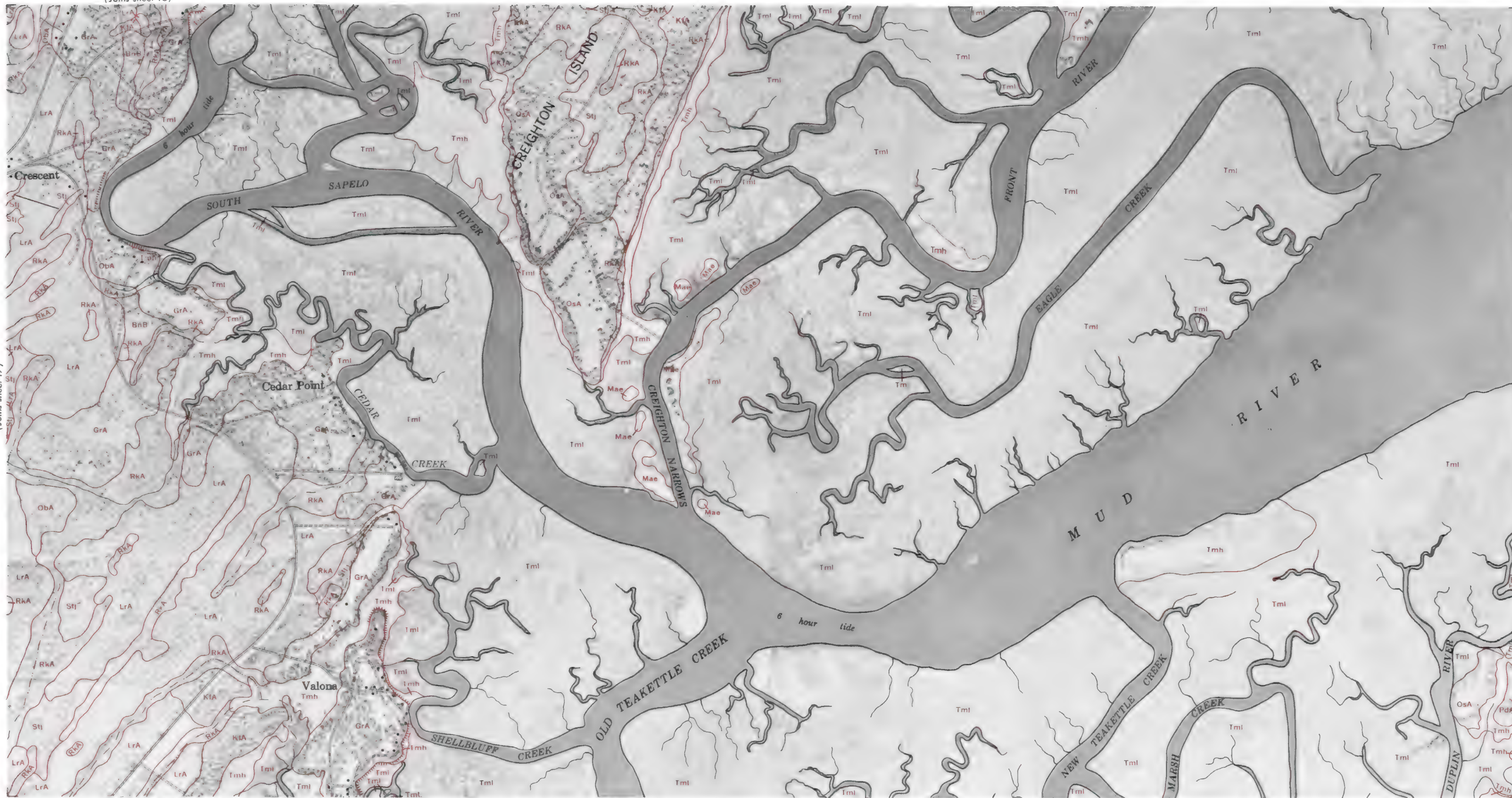
(Joins sheet 16)

(Joins sheet 18)





(Joins sheet 17)



(Joins sheet 23)



(Joins sheet 19)





(Joins sheet 18)

(Joins sheet 24)

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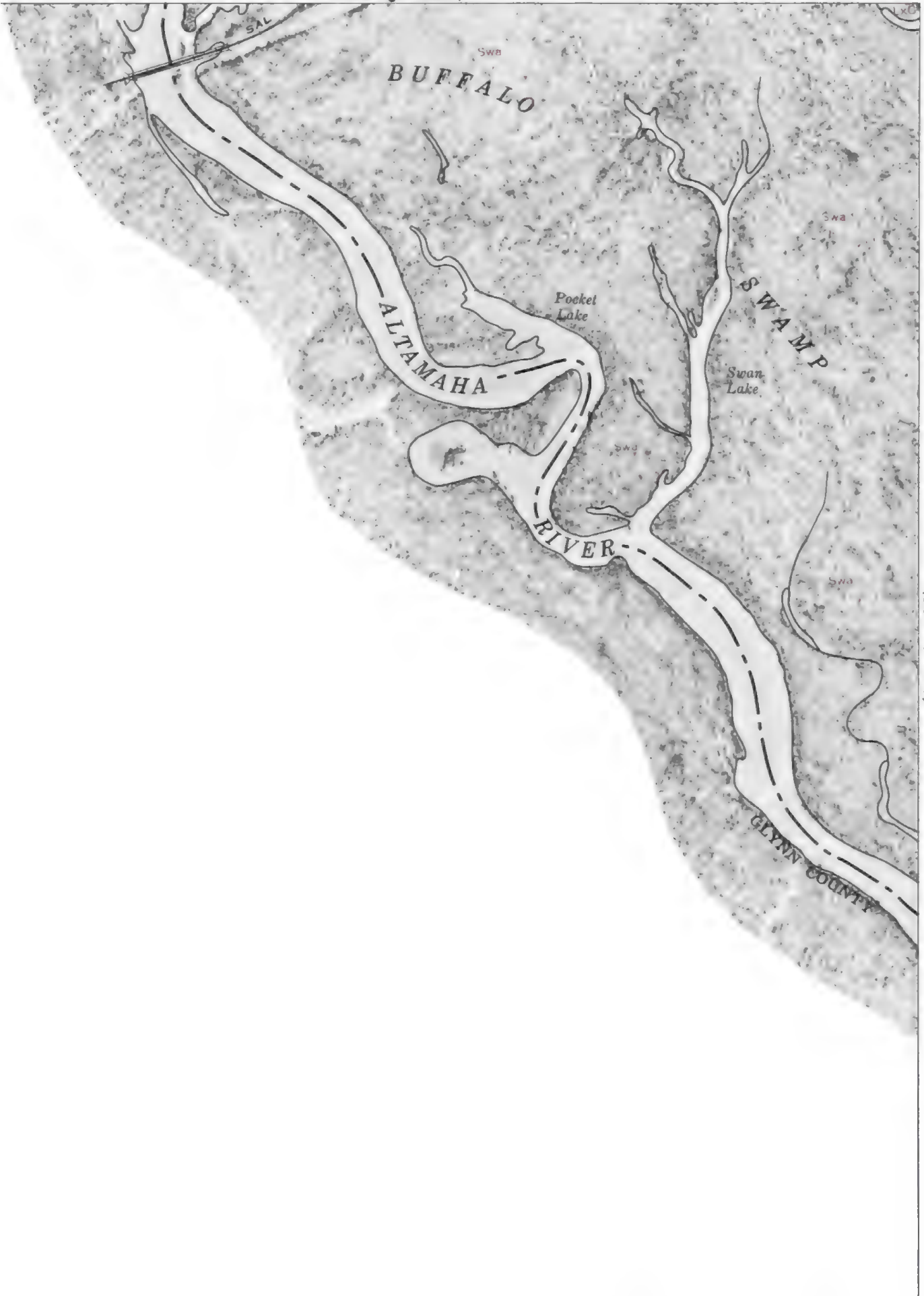




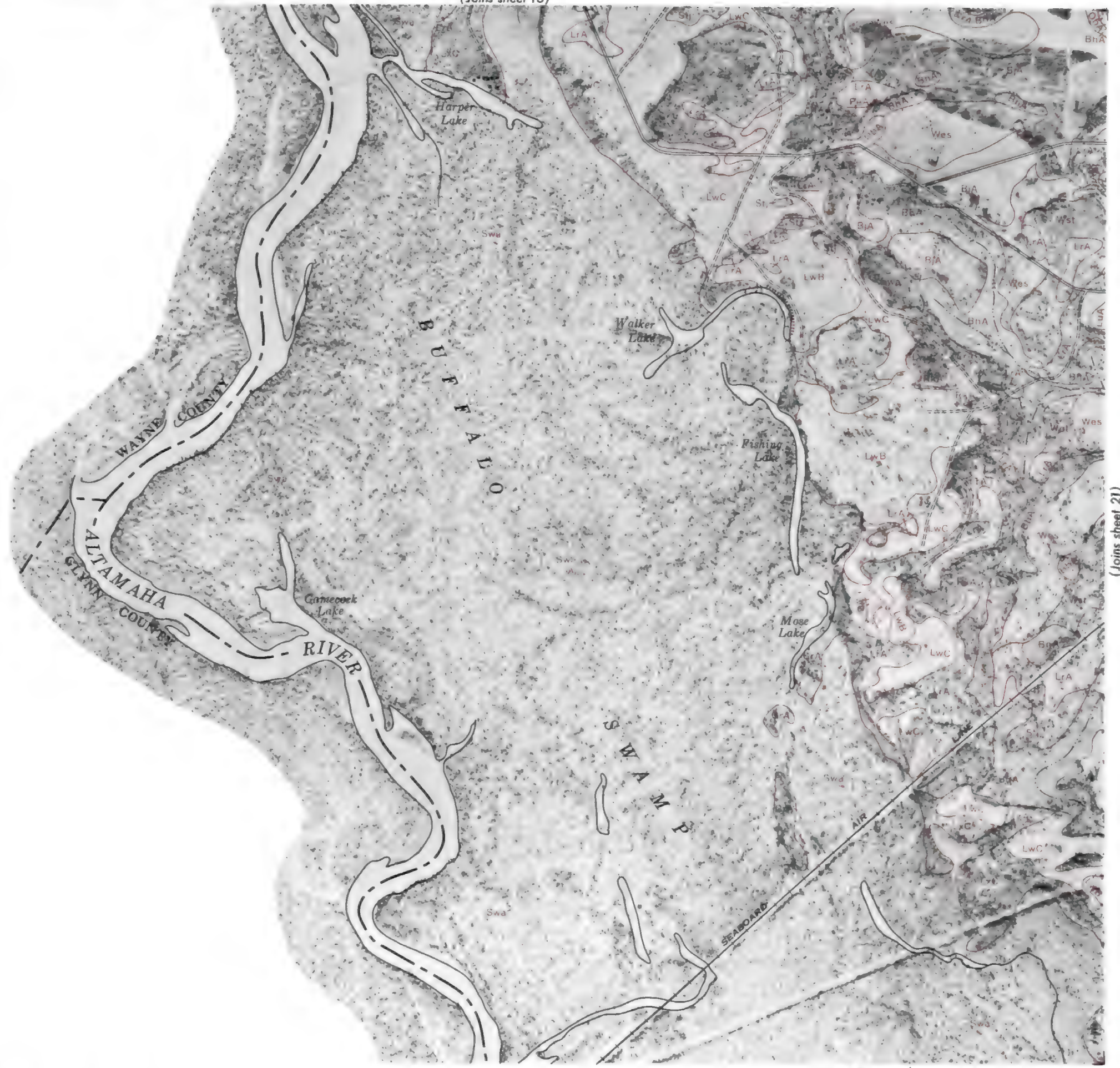


(Joins right below)

(Joins sheet 15)



(Joins sheet 25)



(Joins sheet 21)

(Joins left above)



(Joins sheet 20)



(Joins sheet 25)

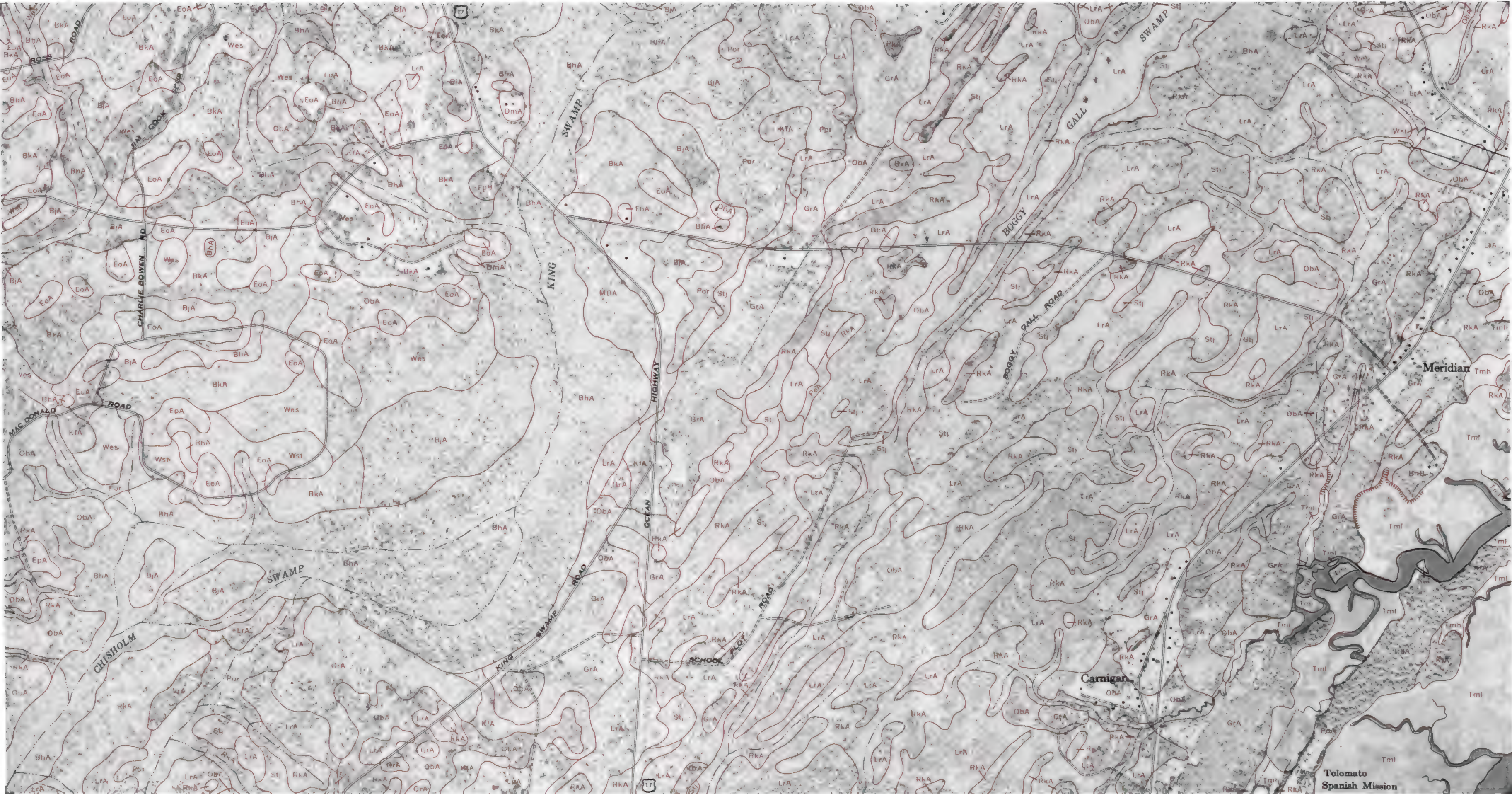




(Joins sheet 17)



(Joins sheet 21)



(Joins sheet 26)

(Joins sheet 23)

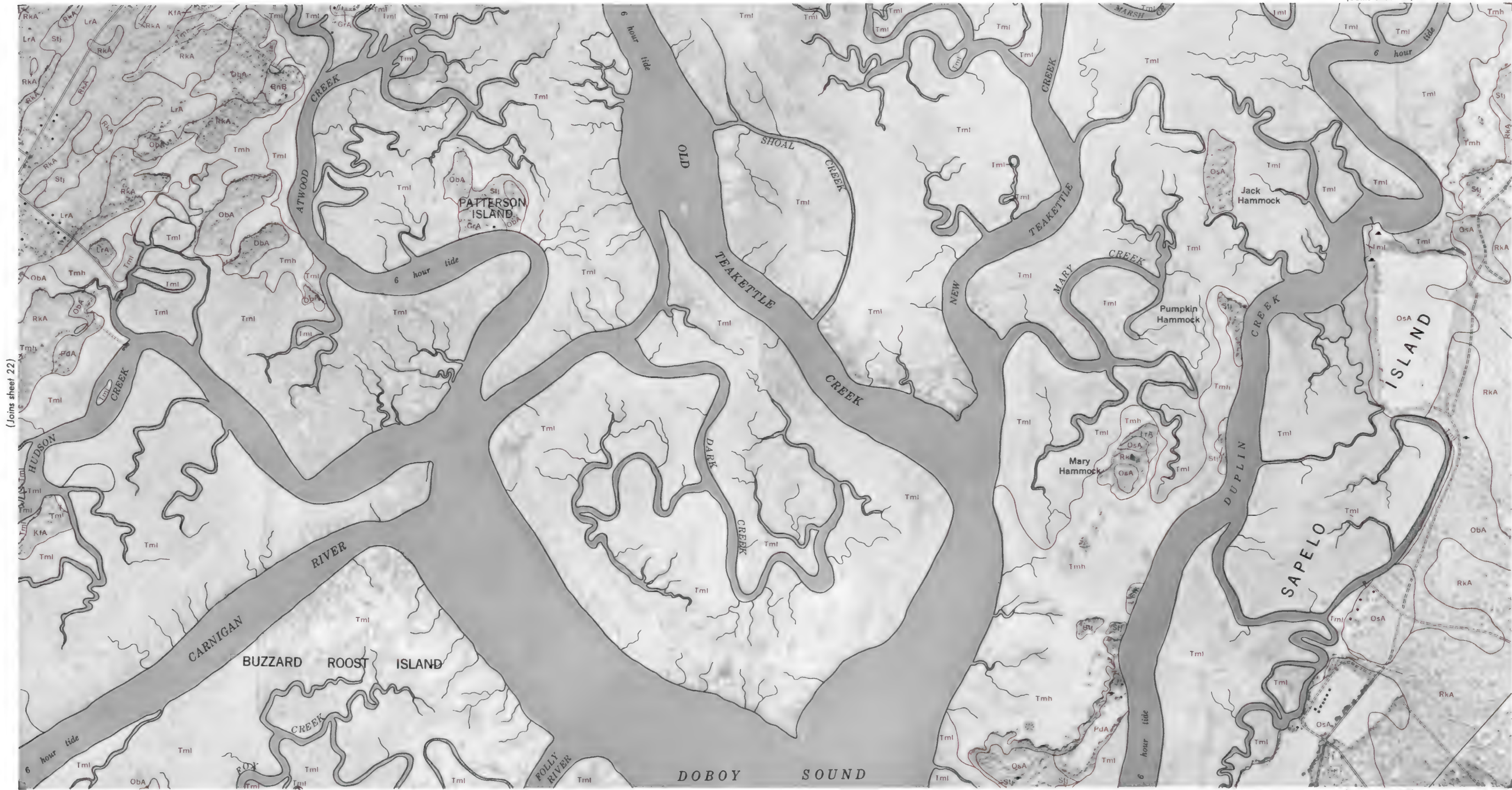




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(Joins sheet 22)

(Joins sheet 24)



(Joins sheet 27)



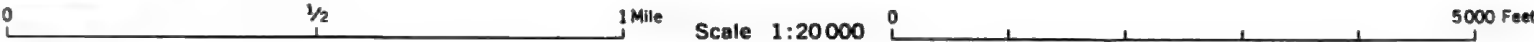
(Joins sheet 19)



(Joins sheet 23)



(Joins sheet 28)





(Joins sheet 21)

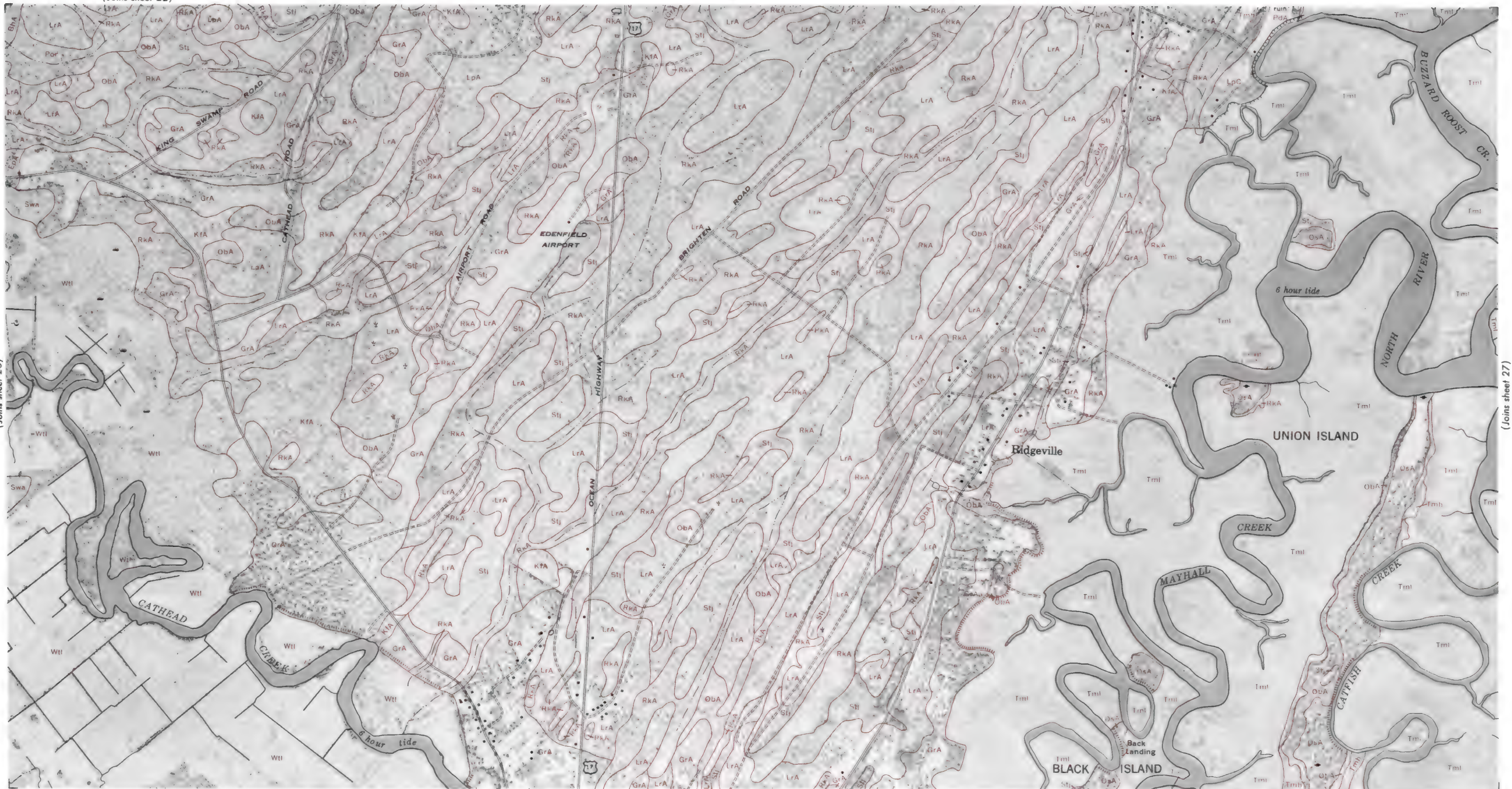
(Joins incant sheet 20)

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(Joins sheet 25)



(Joins sheet 27)





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(Joins sheet 26)

(Joins sheet 28)



(Joins sheet 31)



28

(Joins sheet 24)

**N**

(Joins sheet 27)

O C E A N

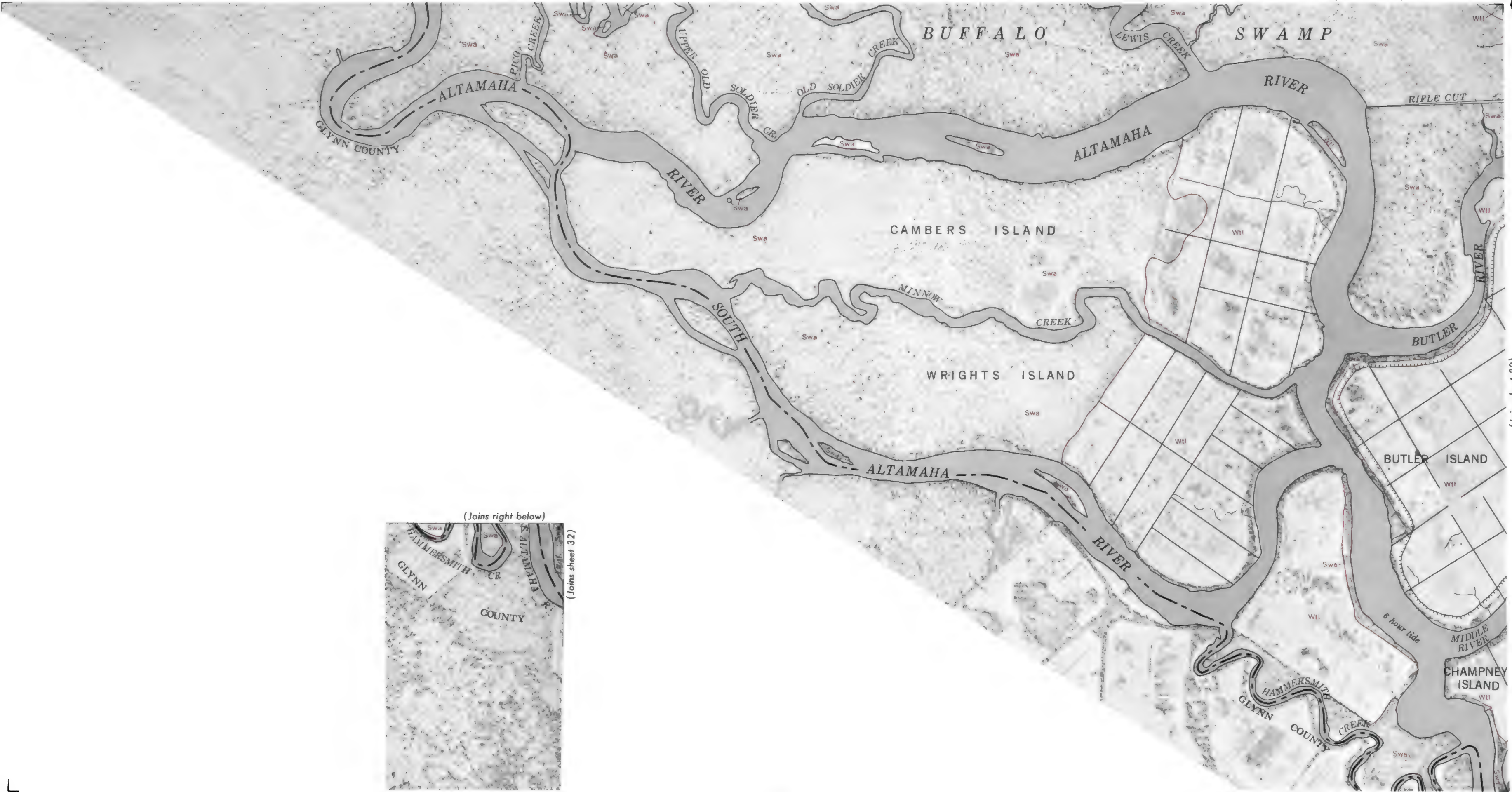
SAPELE  
ISLAND

CABRETA  
ISLAND

St. Luke  
Church

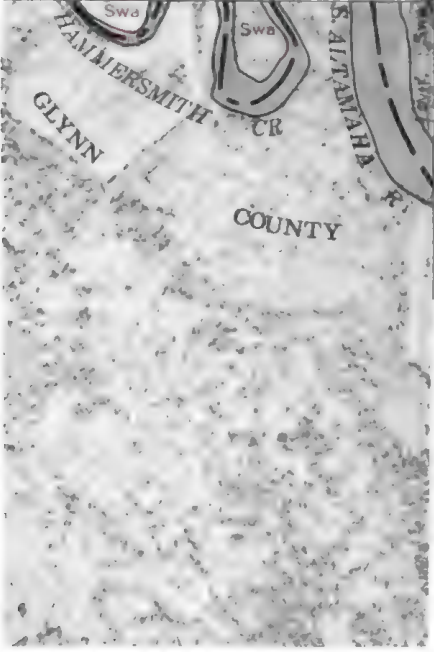
CABRETA  
ISLAND

0 1/2 1 Mile Scale 1:20 000 0 5000 Feet



(Joins sheet 30)

(Joins right below)



(Joins sheet 32)



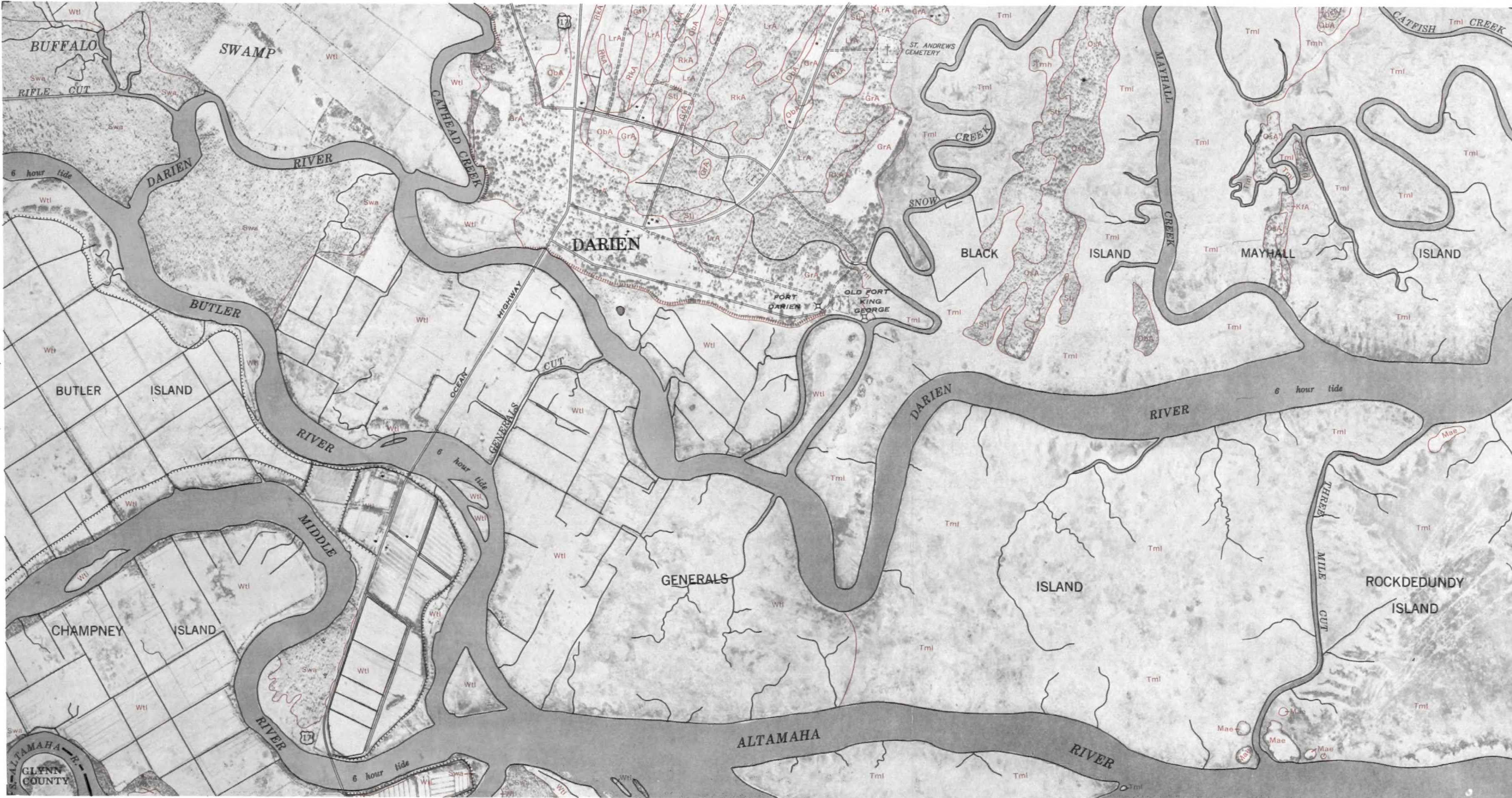
(Joins left above)

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(Joins sheet 29)



(Joins sheet 31)





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(Joins sheet 30)



0 1/2 1 Mile Scale 1:20 000 0 5000 Feet (Joins sheet 33)







(Joins sheet 31)



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(Joins sheet 32)

